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# GONORRHOEA IN WOMEN

BY

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DEDICATED  
TO  
PROFESSOR A. NEISSEN,  
the Discoverer of the Gonococcus.



## PREFACE.

This monograph is presented to the medical profession in the hope that it may serve in its way to instruct some and to awaken all to a greater realization of the supreme importance of the subject of Gonorrhœa in Women.

Nowhere in the English and American medical literature is the subject presented in its entirety. While the author does not presume to present all the literature to date, the effort is made to compile the best in our possession and to present the views of the best workers in this field. Where possible he has quoted these authorities *verbatim*.

For those who wish to go further into the literature a bibliography is appended.

1908.



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## HISTORICAL SKETCH

The history of gonorrhoea is as old as that of the human race. Out of the obscurity of legends and traditions we trace the records of gonorrhoea.

It is of interest to note that these records were at first sufficiently clear for identification, but at a later period when syphilis ravished Europe the relatively mild and harmless symptoms of blennorrhoea were lost sight of, or were looked upon as minor manifestations of the more virulent contagion, syphilis. The two diseases were grouped together; they were alike contagious, they primarily involved the genitalia and were not infrequently coincident.

It was not until the middle of the eighteenth century that the two diseases were looked upon as two distinctly different sorts of infection. By this time syphilis was no longer so virulent a scourge, and we find the medical profession giving more serious and intelligent consideration to what was then popularly termed blennorrhoea.

The Jews had fairly accurate knowledge of the disease. Moses, in the 15th Chapter of Leviticus writes: "When any man hath a running issue out of his flesh, because of his issue he is unclean."

In Deuteronomy XXIV; 1, we read that if a man should marry a woman, "and it should come to pass that she find no favor in his eyes, because he hath found some uncleanness in her, then let him write her a bill of divorcement."

Celsus (VI, XVIII) writes of ulcers under the prepuce or in the glands, or in the urethra, from which a purulent discharge may come. He also writes of inflammations of the testicles, but does not allude to these lesions as due to sexual intercourse.

Maimonidis describes blennorrhoea as follows: "The fluid escapes without erection and without a feeling of pleasure; the appearance is similar to that of barley dough in water, which is dissolved or coagulated albumen, and is the result of the internal disease;

it is also essentially different from the seminal fluid and mucus, the latter being more homogeneous."

Galen wrote (*De Locio Affect*, VI-VI.) that gonorrhoea is an involuntary excretion of sperm, and is derived from *youn*, seed, and *pew*, to run. While our present knowledge would not permit of such a construction, it would be ill advised to attempt to substitute the term gonorrhoea by another.

Arctaeus differentiates vaginal fluor from blennorrhoea. Herodotus (*Clio* 1-105), writes that the Seythians, in an expedition to Ascalon, Syria, pillaged the temple of Venus Urania, and that the goddess inflicted upon them and upon their posterity a female disease, and those thus afflicted were called *oi Evapees*.

A remedy used by the Romans was called bубонium; hence the origin of the word *bubo*.

In Numbers V,II we learn that the Israelites "put out of their camp every leper, and every one that hath an issue," a practice later known to the Romans. In the Jerusalem Talmud frequent references are made to gonorrhoea. A more detailed description of gonorrhoea is found in the writings of Mesue (904), Ali Abbas (980) and Rhazes (852). In 1497 James IV of Scotland, becoming alarmed at the spread of the disease, issued the celebrated proclamation, banishing the infected from the city.

We find the word venereal first used by Rethencourt of Rouen in 1527.

Until 1753 it was generally supposed that the urethral discharges came from abscesses in the urethral passages.

The Roman doctors refused to treat the disease, leaving the treatment among the rich to the slave doctors, while the afflicted poor were driven into seclusion.

During the middle ages frequent references to gonorrhoea appeared in the literature, and there were police ordinances for the prevention of the spread of the disease by prostitutes. Eighteen houses of prostitution in Southwark, a suburb of London, were under the supervision of the Bishop of Winchester. The following quotation is from this ordinance: "That no stewholder keep noo woman wythin his hous, that hath any sickness of Brenning" (the perilous infirmity of burning.)

Thus we see that the nature and contagiousness of gonorrhoea

were known in the middle ages, and that steps were taken to prevent the spread of the contagion.

Finger writes of the existence of two camps of syphilidologists at the end of the 18th century—the identists who believed in the identity of the virus of clap and syphilis, and their opponents, the dualists.

John Hunter offered himself as a sacrifice to the cause under dispute. In May, 1867, he made two incisions; one into his glands, the other into his prepuce, and in these wounds he inoculated the gonorrhreal pus. Pustules and superficial ulcerations developed about each wound, together with an inflammatory zone. Both spots healed slowly under cauterization. The glands of the groin became swollen in the period of recovery and ulcerated, together with the appearance of a copper colored eruption on the body. John Hunter drew the hasty conclusion that the two diseases, gonorrhoea and syphilis, were identical.

It remained for Benjamin Bell to refute the conclusions of Hunter by well conducted experiments. These experiments were followed by those of Ricord whose conclusions were so convincing that all dispute ceased, and hence it follows that from thence to the present time gonorrhoea and syphilis are no longer regarded as identical.

Not until the latter part of the nineteenth century was there any evidence in the literature that the clinical significance of gonorrhoea in women was in any degree appreciated. Prior to this time the subject was rarely referred to in print. Reference was frequently made to catarrh of the urethra, vagina and uterus, but its specific nature was little suspected.

A noteworthy advance was made to our clinical knowledge of the subject by Bernutz and Goupil who in 1857 published their observations on gonorrhoeal infection of the Fallopian tubes, ovaries, and pelvic peritoneum. This was at a time when little was known of the inflammatory diseases of the uterine adnexae.

From the view point of the modern gynecologist the observations of Bernutz and Goupil were fundamental in their clinical import, for without the knowledge that gonorrhoeal infection involves the uterine appendages and pelvic peritoneum, we could not appreciate the dire consequences of the infection, and we would fail utterly in our management of these cases.

We find that gonorrhoea was more often recognized in men than in women, for the reason that it was known that there was seldom any other cause for a secretion in the male urethra, while in woman leucorrhœal discharges were known to arise from many causes.

In 1858 West ventured the opinion that blennorhœa may extend to the uterus and thence to the tubes and peritoneum. His views were later supported by Dobson, Nelson and Giles.

Our appreciation of the awful prevalence of the disease originated in the observations of Noeggerath, of New York City, (1878) but the full significance of the lesions and their extent was made possible by the discovery of the essential cause, the gonococcus of Neisser in 1879.

As Buñm has happily put it, "Noeggerath was more fortunate than Semmelweis; he lived to see the triumph of his observations. For this he has to thank Neisser, who soon after discovered the gonococcus and made possible the certain proofs of his statements relative to the frequency of the lesion."

Prior to these epoch-making periods gonorrhœa was diagnosed in the male with comparative ease, because of the fact that of 100 discharges from the male urethra 99 were due to gonorrhœa, while in the female urethral and leucorrhœal discharges are due to a great many causes, and therefore the only positive means of identifying a gonorrhœal discharge is to recognize the essential cause.

Noeggerath made extended observations in New York City and published statistics that provoked no little criticism. He stated that 80 per cent of married men have had gonorrhœa; that 90 per cent of these have never been thoroughly healed, and that of five married women three have gonorrhœa.

That his deductions from personal observations are regarded as extravagant and unwarranted would seem apparent, from a study of the literature.

## ETIOLOGY.

The essential cause of gonorrhœa was discovered in 1879 by Neisser and is known as the Gonococcus of Neisser.

This micro-organism is a diplococcus. Its shape is commonly spoken of as that of a double biscuit, the two halves being separated by a narrow open space. The Germans see in the organism, a resemblance to their biscuit called a "semmel." Their large size and characteristic form and grouping make them easy of recognition. Their average diameter from pole to pole is 1.25 $\mu$  with an inter-space of about 0.08 $\mu$  between the two halves of the organism. Groups of four and eight cocci are occasionally seen. They are never arranged in chains. The gonococcus is small, non motile and does not have spores.

The organism is best stained with weak aqueous anilin dyes and characterized in its staining qualities by not taking the Gram's method of staining. This is not an infallible test, hence too much dependence cannot be placed upon it.\*

The cultivation of the gonococcus is a difficult task and one which requires technical knowledge. Wertheim first cultivated the gonococcus in human blood serum to which was added 2 per cent agar agar. This medium was placed in Petri dishes and kept at a temperature of 40 degrees C. until the medium solidified, when it was transferred to a temperature of 37 degrees C. for twenty-four

\*Gram's Stain.—(a) After drying and fixing the film, stain for five minutes with a strong anilin—gentian violet solution. (b) Without washing, treat with Gram's iodine solution for two minutes (iodine 1, iodide of potassium 2, distilled water, 300). (c) Decolorize in absolute alcohol until no more violet color is seen to come away.

It is common to find groups of these cocci within pus cells and at the margins of epithelial cells.

In the early stages of the infection, few if any other micro-organisms are associated with the gonococci, but in the later stages of the disease they may be far outnumbered by other pathogenic micro-organisms.

The technic of preparing the secretions for examination is simple. A clean glass slide is lightly smeared with the secretions, dried in the open air or by passing high above the flame of an alcohol lamp. An alkaline aqueous solution of methylin blue is poured on the slide and is washed off in a minute or two by running water when the slide is allowed to dry. A drop of cedar oil is placed upon the stained film and the examination is made with a 1:12 oil immersion lense. The pus cells are stained faintly blue, the nuclei a deeper blue and the gonococci a dark blue.

hours, at which time the colonies should appear bearing a dark center and granular zone. Transferring one of these colonies to a slanting tube of the above mixture, small isolated grey colonies appear, which later become confluent and produce a delicate grey smear upon the surface. The margin of the growth is not sharply defined, but gradually fades away into the medium.

Purro says that gonococci grow on acid gelatin and acid urine, while the pus cocci which may be associated with the gonococci sink deeper into the medium. Wright prefers a mixture of blood serum, peptone, agar agar and urine.

It was early believed that a gonorrhoeal infection could not be experimentally transplanted to animals, but Turro claims that he has cultivated the organisms in acid media and transferred them to the urethra of dogs with positive results. Bumm does not agree with these findings and affirms that the gonococcus can only be successfully inoculated in the human body. McFarland claims that gonococci show remarkable vitality even in dried secretions, and quotes the experiments of Kratter, who demonstrated their presence in dried secretions on clothing six months after the original soiling.

Bumm points to the fact that the shape and position of the micro-organism are not positively characteristic and insists upon the Gram stain for accurate recognition. The bacteriological diagnosis of gonorrhoea is of the highest medical and medico-legal importance and is essential to the pronouncing of an absolute cure in all cases.

In view of the fact that the gonococci are not evenly distributed throughout the secretions, it may be necessary to stain several slides. No antiseptic injections should be made for several hours prior to the examination.

In chronic cases the examinations should be conducted at intervals of days because of the micro-organisms. The time most favorable for finding the gonococcus would be on the day following the cessation of the menstrual flux.

In the chronic stage the gonococci are seldom found within pus cells, but lie free or hanging to epithelial cells. This adds to the difficulty of finding them.

The following rules are laid down by Seedhal-Green for the identification of the gonococcus:

“1. The presence of a kidney-shaped diplococcus in groups of four or multiples of four;

“2. The situation of the coccus within the body of the pus cell;

“3. The non-retention of the coccus of Gram’s stain; and

“4. The failure of the coccus to grow on gelatin or agar.”

Neisser formulates the following rules to be applied in the diagnosis of gonorrhœa by the aid of the microscope.

“1. From the form of the diplococcus. The microscopical specimen shows almost always two cocci lying like coffee-beans closely to one another, very often not only as one pair, but in groups of two, four and eight pairs.

“2. From the intra-cellular position wherever there are leucocytes in anything like abundant numbers. It must, however, be borne in mind, firstly, that gonococci occur extra-cellularly also, and, secondly, that other bacteria may also be located intra-cellularly.

“3. From the peculiar size. It seems to me superfluous to give here definite measurements. I should like, however, to recommend that a reliable specimen of gonococci, stained, of course, in the same manner as the preparation about to be made, be kept ready at hand for use as a test-specimen in doubtful cases, with which to compare dubious preparations under the same power.

“4. By a definite attitude towards the staining by Gram’s method. Almost all the diplococci, eventually mistaken for gonococci, are distinguished from the latter by the fact that in applying Gram’s staining method, they retain the dark violet colour, are not decolourized by the use of decolourizing agents, and that they do not, if treated with counter-staining agents, take up the counter-stain. Gonococci, on the other hand, lose the blue-violet colour and take up the counter colouration, whether the same be instituted with weak carbol-fuchskin solutions, Bismarck-brown or Methyl-blue.

“I am now in the habit of examining every case of chronic urethritis by means of Gram’s method. It affords, in any case, from the beginning, if there are any suspicious diplococci present at all, a much greater certainty whether we have to deal with gonococci or not.”

The bacteriologic examination may be of prognostic value in so far as the number of gonococci is usually in direct ratio to the acuteness and virulence of the infection.

### DIFFICULTY OF DIAGNOSIS.

Neisser makes the following observations relative to the difficulties involved in making a diagnosis of gonorrhœa in the chronic stage:

“1. In the chronic cases there are almost always only very few gonococci present. It may, of course, happen that in chronic gonorrhœas there may take place, owing to some accident (frequent and rapidly repeated sexual intercourse, irritation by alcoholic excesses; in women, in association with menstruation) simultaneously with the increase in the inflammatory appearances, an increase also in the number of gonococci, but this is not absolutely necessary, and it is quite possible, in spite of severe inflammations of such nature as to suggest a fresh infection, for the gonococci to remain very sparse.

“Since there is not, under such circumstances, a diminution in the biological peculiarities of the gonococci, it follows that these non-multiplying gonococci which have apparently also been deprived of their power to cause suppuration possess full virulence and also a capacity for producing suppuration, if transferred to some other mucous membrane.

“2. But the gonococci are in chronic cases not only difficult to find on account of their scarcity—even in a large number of microscopical preparations, it is possible for the few small heaps of double cocci, lying perhaps extra-cellularly or singly, to escape observation easily—but also because in most cases of chronic urethritis there are also millions of other bacteria present, small and large bacilli, and also cocci, which naturally make the finding of the gonococci lying between and mixed up with them, uncommonly difficult or downright impossible.

“3. Among these urethral parasites there are found occasionally diplococci which are remarkably alike to the gonococci, so that the point whether some kind of diplococci are really genuine gonococci presents sometimes great difficulties. If we possessed an absolutely specific staining method, such, for instance, as the one for tubercle bacilli, the differentiation between gonococci and gonococci-like diplococci would naturally be much easier.

“It has been asserted by some authorities that the gonococci change in regard to their forms and that they can assume quite un-

characteristic appearances of degeneration without losing thereby their capacity for multiplication and their virulence, making it in this way possible for gonorrhœa-producing bacteria to pass unrecognized on account of the absence of all their morphological peculiarities. I have never been able so far to satisfy myself about the existence of such forms of degeneration. It is true that gonococci are constantly perishing in cultivation-media and probably also on the mucous membranes of the patients, and that we come across all sorts of decaying forms. But then these have generally lost their power of multiplication also, and we have before us consequently harmless bacterial residua which are no longer capable of causing any infection.

“4. The scanty gonococci present in a genital tract are not always accessible for examination, because they are not mixed with the superficial secretion employed in the preparation of microscopic specimens or cultivations. It is, therefore, part of the examiner’s duty to discover all the hidden recesses into which gonococci may have crept and to subject the specimens contained in them to careful investigations.”

### **EXAMINATION OF THE URINE.**

In dealing with women of a sensitive nature it is well to know that the microscopic examination of the urine is of great value.

The urine (the morning specimen preferred) is placed in a conical urinary glass, and floating upon the surface may be seen a few gelatinous threadlike bodies which, under the microscope, are seen to be composed of mucous, pus epithelium and bacteria. This is best seen in the early stage of the disease. As the disease progresses, more pus is added to the urine and forms, on standing, a creamy sediment. The mucous proportionately diminishes and forms a light, cloudy sediment above the pus. As the disease progresses toward recovery, the amount of pus steadily diminishes, the mucous increases, then decreases, and the last to disappear are the threads which float to the top.

### **PATHOGENIC CHARACTER OF THE GONOCOCCUS.**

“The following resumé of the investigations into the pathogenic character of the gonococcus is given by Finger:

1. The gonococcus is found in all cases of suppuration of the mucous membranes, especially of the genitalia and conjunctiva, which are described clinically as gonorrhoea.
2. It is absent in all non-gonorrhoeal processes.
3. Pus free from gonococci does not produce gonorrhoea.  
(Zweifel, Welander.)
4. Pus containing gonococci produces gonorrhoea.  
(Welander.)
5. The micro-organisms which are cultivated from gonorrhoeal pus, but which are not identical with the gonococcus, do not produce gonorrhoea. (Sternberg, Lundschem, Chameron.)
6. The gonococci cultivated from gonorrhoeal pus produce gonorrhoea with distinct increase of the inoculated micro-organisms.

(Bumm, Aufuso, Wertheim, Ghon, Schlagenhaufer,  
Finger.)

Thus, (says Finger), is the etiology of gonorrhoea well established, its virulence and virus are proven."

## PATHOGENESIS.

The gonococcus is not capable of infecting the vulvar and vaginal surfaces when covered with intact squamous, stratified epithelium, as is found during the period of sexual maturity. In infancy and old age gonorrhœal infection of these surfaces is possible, due to lowered resistance of the epithelial covering. In the urethra, cervix and corpus uteri, the delicate epithelium does not resist the inroads of the gonococcus; here infection is possible without loss of the surface epithelium.

There is no evidence that immunity exists in certain individuals. The fact that two men may have sexual intercourse with the same infected woman and one acquire the disease, the other not, is not evidence of immunity in the latter. In such cases we must conclude that the micro-organisms did not come in direct contact with the vulnerable surfaces in the latter individual, or were successfully disposed of by cleansing. A woman cohabitating with an infected man may escape infection because the infectious secretions do not come in contact with vulnerable surfaces or the urethral passages of the male have been previously cleansed by urinating. We not infrequently see individuals who are apparently immune because they have a latent infection, which gives rise to no subjective symptoms.

Individuals are observed to infect others, yet apparently are themselves immune to infection. The explanation lies in the presence of a chronic gonorrhœal infection in the absence of all clinical signs. In the first individual the gonococcus had little virulence, but when transmitted to sterile tissues it assumed an active rôle.

Husband and wife may both be infected, neither manifesting symptoms of the disease, yet a third individual having intercourse with one or the other may acquire a virulent infection. Again, the husband may infect his wife, then have no intercourse with her until he is apparently cured, when, on resuming sexual relations with his wife whom he had previously infected, he in turn is inoculated by her.

That there is an acquired immunity there can be no doubt, yet examples are not rare in which a second infection has followed closely upon the first. Congenital immunity has been observed, but such instances are rare.

The great majority of infections in the female is conveyed from chronic gonorrhoea in the male.

Prior to the discovery of the gonococcus it was not possible to say, with assurance, that a latent infection did or did not exist in the urethra, for the reason that the now well established fact that gonococci may exist in the absence of a discharge, or may not exist in the presence of a purulent discharge, was not then known.

Noeggerath was the first to appreciate the great chronicity of the disease, and, while he was extravagant in the expression that the disease usually lasts a lifetime, he cannot be said to have been far wrong. Noeggerath allowed of only 10 per cent of cures of gonorrhoea of the male urethra. Bumm gives a much larger percentage, but will not venture a positive statement. He has found gonococci in the urine and in the secretions five and ten years after the onset of the infection.

Gonorrhoea may exist in the genital tract during the period of pregnancy without clinical manifestations and become active during the puerperium. This explains many obscure cases of puerperal infection. Oppenheimer found the gonococcus in 27 per cent of 108 pregnant women. The menstrual act may have a similar effect.

That gonorrhoeal infection is frequently conveyed by contaminated hands, instruments, and dressings is a fact too well established for comment. Happily, however, this danger is minimized by the early death of the organism in dried secretions.

Wertheim obtained a pure culture of the gonococcus from a gleet of two years' standing. Attempted inoculation of the original urethra with these organisms failed. Then a urethra free of infection was inoculated, causing an acute inflammatory reaction, and from this infection the original urethra was inoculated, and a fresh attack was produced which ran a typical course for six to eight weeks and then subsided into a chronic state. It was thereby proved that by passing gonococci through a second individual they may acquire added virulence. This explains how an apparently healthy subject of chronic or latent gonorrhoea may infect his wife and in

turn be infected by her. It is observed that the gonococcus increases in virulence during and immediately following menstruation and pregnancy.

It is comparatively rare that gonorrhoeal infection is acquired by means other than sexual intercourse, for the reason that the secretions when dried are innocuous. This is most fortunate, for otherwise we should experience epidemics which would be appalling. We have in the spread of ophthalmia of the newborn in maternity wards a suggestion of the contagious element in this disease. I now have under my care a woman who was infected from soiled towels used by an inmate of the house and who in turn infected her husband. Examples are not wanting in which several members of a family have acquired the infection from the bathroom, and cases have repeatedly been traced to the dispensary and office, where the instruments and hands of the examining physician were not properly cleansed. Several children sleeping in the same bed are known to communicate the infection one to another, and children who are nursed by infected mothers and maids are not infrequently contaminated.

The period of inoculation of gonorrhoea varies from twelve hours to a week or more. It is not easy to fix upon this period of inoculation in a given case, because the patient is not always aware of the lesion until it has existed for some time. In fact, if the infection does not spread beyond the internal os, the patient may remain in ignorance of the disease. We are thereby reminded of the uncertainty of relying upon the statements of the patient as to the possible existence of a gonorrhoeal infection.

We usually estimate the period of inoculation from the time of intercourse to the onset of symptoms. A more exact procedure would be to count to the time of appearance of an inflammatory reaction in the urethra or cervix, but since these lesions are not looked for until symptoms arise we can only arrive at an approximate estimate of the period of incubation. Experimental inoculation with pure cultures of the gonococcus has caused an inflammatory reaction in from twelve to twenty-four hours.

The part most likely to be first infected depends upon certain conditions. For example, if the introitus is small, the urethra is most liable to be the seat of initial infection. In infancy the vulva

and vagina are the seats of predilection, and the same may be said of old age, when the uterus has atrophied and the vaginal epithelium is devitalized and desquamated. Gonorrhoeal infection of the rectum is early instituted when acquired through coitus per anum, and in exceptional cases through the soiling of the anus with the vaginal secretions.

It is a well established fact that a woman infected with gonorrhoea may transmit the infection at one time and not at another. Where the infection is confined to the urethra, urination shortly before coitus may temporarily cleanse the urethra. Again, it is known that a latent infection within the uterus may not be transmitted, because the secretions of the uterus do not contain gonococci. In such cases the gonococcus can usually be found in the puerperium and immediately following the menstrual epoch. It is at such times that the husband may be reinfected.

In infants and young maidens, the infection is usually confined to the vulva and vagina, and is, as a rule, acquired through the handling of the vulva with infected fingers, or the bringing in contact with the vulva infected instruments, diapers, towels and douche points. Such contagions are known to spread through a children's ward, and to be conveyed from the infected mother or nurse.

The responsibility for the spread of gonorrhoeal infection may occasionally be laid at the door of the careless physician or the infected physician who does not exercise due care in cleansing his instruments and hands. In the preantiseptic stage such instances were common in dispensary and office practice.

## PATHOLOGY.

### VULVA, VAGINA, AND VAGINAL PORTION OF CERVIX.

The macroscopic appearances of GONORRHOEAL VULVITIS are varied. In the so-called simple catarrhal form the parts are reddened and swollen in the acute stage. At first the surface is dry, but later it is bathed in a profuse muco-purulent secretion which irritates the adjacent skin surfaces. The nymphae become oedematous if the irritating discharge continues.

In the chronic stage the swelling subsides and the discharge is lessened in amount. Papillae may be prominent and bleed to the touch. Superficial excoriations may appear on the vulvar surface.

It is a peculiarity of gonorrhoea of the vulva that the urethra and Bartholinian glands are commonly attacked. In the finding of a purulent secretion in the urethra and of a reddening at the mouths of the ducts of Bartholin, the diagnosis of a gonorrhoeal infection is established to a moral certainty. The diagnosis is further supported by the presence of enlarged and tender inguinal glands.

Multiple small abscesses may be found upon the labia majora—they are located in the sebaceous and sweat glands.

Condylomata accuminata may appear upon the vulvar surfaces, about the anus and inner aspects of the thighs; this is particularly so in event of pregnancy. They present isolated wartlike growths or aggregate to form cauliflower excrescences.

There is nothing characteristic in the naked-eye appearances of *gonorrhoeal vaginitis*. It is only by the associated lesions that the nature of the lesion in the vagina is recognized. In the acute stage the mucosa is swollen and reddened and a profuse muco-purulent secretion rapidly develops upon its surface. As the inflammatory reaction subsides, the secretion lessens and the surface becomes mottled red and grey. In the chronic stage, reddish papillary elevations stud the surface. Rarely do superficial ulcers and condylomata develop.

The vaginal portion of the cervix is commonly the seat of gonorrhoeal infection, but the lesions produced are in

no way characteristic nor constant. Erosions of the cervix present themselves in every stage of development. We find the simple erosion with its smooth surface, irregular outline and livid color. Again the papillary erosion with numerous elevations and infoldings, bleeding rather freely to the touch, but soft in texture as compared with carcinoma. And again may be seen the follicular erosion containing one or many retention cysts. From the cervical canal exudes a mucous or muco-purulent secretion of a very tenacious character.

These parts of the genital tract which are covered by stratified, squamous epithelium, i. e., vulva, vagina, and vaginal portion of the cervix, evince a peculiar resistance to gonorrhoeal infection during the period of sexual maturity. In infancy and old age this epithelium has a much lower resistance, and primary gonorrhoeal vulvovaginitis is not uncommon.

In the height of the infectious process the papillae are crowded with small round cells. On the surface of the mucosa is a deposit of pus cells and cellular debris, and in this deposit are found gonococci in varying numbers. These organisms extend into the inter-cellular spaces of the epithelium, but have not been demonstrated to invade the underlying connective tissue.

The Bartholinian glands, which are frequently involved, are said by Bumm not to be deeply invaded by the gonococcus. Bumm asserts that the gonococcus is confined to the mouths of the glands; that the natural secretions of the glands prevent the further invasion of the organism. According to Gebhard, all deep-seated infections of Bartholinian glands are the result of mixed infections of the gonococcus and staphylococcus. Usually the staphylococcus pyogenes aureus is the associated micro-organism, and when present it is not uncommon to note the development of pus within the lumen of the gland and more or less distending it into an abscess. More often than abscess formation is the development of a retention cyst, the result of gonococcal infection with occlusion at the mouth of the gland. Back of the obstructed outlet the mucous accumulates and distends the glands into a cyst.

### UTERUS.

The *uterus*, when infected by the gonococcus, may present no changes evident to the unaided eye, or there may be present the great-

est variety of inflammatory lesions resident in the mucosa, the musculature and the perimetrium. These changes vary with the virulence of the infecting micro-organisms and with the chronicity of the infection.

In the endometrium we find the infection commonly localized in the cervix. Here, in the acute stage, there is hypersecretion of the mucous glands, reddening of the surface and a moderate swelling of the mucosa. In the chronic stage the cervical endometrium is rarely involved uniformly. A tenacious mucous or muco-purulent secretion bathes the surface and fills the cervical canal, the mucosa is thrown into irregular elevations which become moulded by the cervical canal into polypoid bodies. These polyps may be one or many in number; they may present at the external os or protrude into the vagina. To the touch they bleed slightly, are little or not at all sensitive, soft or firm in consistency, but never friable unless they have undergone **necrotic** or **malignant** degeneration.

In the body of the uterus the loose texture and the extensive surface of the endometrium permit of a greater diversity of lesions. We find in the acute stage of the infection a more or less uniform reddening and thickening of the entire surface, with a profuse serous or sero-purulent secretion bathing the surface.

In the chronic stage the endometrium may be uniformly thickened (**hypertrophic endometritis**), thrown into folds and fungosities (**fungous endometritis**), covered with shaggy villosities (**villous endometritis**), or the seat of one or many mucous polyps (**polypoid endometritis**).

It is peculiar to gonorrhoeal endometritis that the changes in the tissues are not uniformly distributed over the surface, but are commonly found in isolated patches.

The musculature is always more or less affected secondary to the endometrium. These changes may range from a moderate congestion of the blood vessels to cellular infiltration of the tissues involving part of the wall of the uterus.

In the acute stage the musculature is slightly increased in thickness, it is succulent from a serous infiltration, and turgid from the engorgement of blood vessels.

In the chronic stage the walls of the uterus are thickened even to double their normal dimensions. There is an increase in the firm-

ness of the texture and a loss of the normal elasticity. This is due to the increase in connective tissue at the expense of the musculature. The measurements of the uterus are extended in all directions; rarely is there localized thickening of the musculature which may suggest the presence of a fibroid tumor.

Perimetritic adhesions are of common occurrence. These are seldom the result of extension of the infection through the uterine wall, but rather from the infected appendages. For this reason the adhesions commonly exist at the sides and behind the uterus.

We are indebted to Wertheim, Uter, Madlener, Tussenbroek and Mendes de Leon for their studies of gonorrhoeal infection of the uterus. By these observers numerous groups of gonococci were seen to occupy spaces between the superficial epithelial cells and to a lesser extent the intercellular connective tissue spaces. Madlener made histologic observations in a case ten weeks after the initial infection, which was the seventh week of the puerperium. In this case gonococci were distributed throughout the entire uterine musculature. Bumm states that only once has he seen the gland structures invaded by the gonococcus. This was in a Nebothian follicle, in which large colonies were found in the retained secretions.

It will be of interest to here record the observations of Wertheim. He extirpated the uterus in 18 cases, in 8 of which the gonococcus had been previously demonstrated in the uterine secretions. In all of the 18 uteri there were found gonococci between the superficial epithelial cells and in the superficial connective tissue spaces of the mucosa. No gonococci were found in the deep connective tissue layers and few were found in the cervical epithelium. The interglandular connective tissue spaces were filled with pus cells and small round cells. In more than half the cases there was a glandular hypertrophy. In many cases inflammatory changes could be seen in the musculature, but no gonococci were identified, though it could not be affirmed that they were not there.

Bumm asserts that in chronic gonorrhoeal infection of the cervix the gonococcal invasion is confined to isolated areas in the mucosa. He further observes that the glands of the cervix are not invaded and that the regenerated epithelium of the cervix is immune to invasion by the gonococci. These observations are of the highest clinical significance.

The observations of Bumm in the gonococcal infections of the corpus uteri are in accord with those of Wertheim. He makes note of the fact that in the mucosa of the corpus, as is also true of the cervix, the micro-organisms are found in groups here and there over the surface. The glands were not found deeply infected. The gonococci were found to more deeply infiltrate the mucosa of the corpus than of the cervix, and the round-cell infiltration was everywhere marked. In the areas occupied by the gonococci the epithelium was commonly flattened and in many layers.

### FALLOPIAN TUBES.

*Gonorrhoeal Salpingitis*, as with all lesions of similar origin in the genital organs, bears no distinctive anatomical characteristics by which its specific nature can be recognized from its gross structure. The catarrhal and suppurative forms of salpingitis, together with their end stages—hydrosalpinx and pyosalpinx—do not differ in their naked eye appearances from those due to other sorts of infection. It is only by the detection of the gonococcus in the contained secretions and in the walls of the tube that the gonorrhoeal element is recognized to a certainty.

Acute gonorrhoeal catarrhal salpingitis presents a tube of a livid or dark red color, slightly thickened and convoluted, with fimbriae red, swollen and retracted to a variable degree preparatory to the possible closure of the abdominal end of the tube. The consistency of the tube is somewhat firmer than normal. On cross-section the mucosa is found thickened and protrudes from the cut surface. In the lumen of the tube is an excess of serous secretion. There are no adhesions surrounding the tube.

In the chronic stage of gonorrhoeal catarrhal salpingitis, the tube enlarges in all diameters and is correspondingly convoluted. There is a marked firmness to the texture of the tube. The congested blood vessels and the increase in the connective tissue thickens the tube wall and narrows the lumen of the tube. Adhesions may surround the tube and close the fimbriated end. A nodular enlargement, varying in size from that of a split pea to a bean, may develop at the uterine end—the so-called salpingitis isthmica nodosa. The lumen of the tube may become wholly or partially obliterated or through closure of the abdominal end the contained

secretions may distend the tube into a sac (hydrosalpinx). In the latter event the tube assumes a club shape, retort shape or irregular sausage shape and may distend to the size of a child's head. Rarely is this distention found at the uterine end of the tube. As the tube distends the walls become thin and transparent. The contents of the distended tube is a thin serous fluid. Rarely does a hydrosalpinx communicate with a cyst of the ovary to form a tubo-ovarian cyst.

Gonorrhoeal purulent salpingitis in the acute stage presents a greater inflammatory reaction than does the acute catarrhal form. The color of the tube is a livid red, the size may be that of the thumb, the blood vessels stand out prominently under the serous covering, the fimbriae are greatly swollen and retracted; rarely is the abdominal end closed until the lesion is far advanced and then only insecurely while the acute stage lasts. A fresh fibrinous exudate forms about the tube, binding the tube to surrounding structures; these adhesions become more and more firm as the acute merges into the chronic stage. In the lumen of the tube pus accumulates in varying amounts.

In the chronic purulent stage the average size of the tube is that of the index finger. The reddening fades, the adhesions become firmer and more extensive, the consistency of the tube is firm and the abdominal end is obliterated. The convolutions of the tube are bound closely to one another by adhesions and the entire tube is intimately bound to surrounding structures, i. e., ovary, bladder, bowel, uterus and broad ligament. The pus within the tube is thick and of a yellowish grey color. In long-standing cases the formed elements of the pus may be absorbed, leaving a serous fluid. Nothing can be ascertained from the naked-eye appearance of the pus as to its virulence. The entire wall of the tube is thickened through congestion of the blood vessels and hyperplasia of connective tissue. Small isolated abscesses may be located in the walls of the tube from the mucosa to the serosa.

Where the ends of the tubes are closed the contained pus may distend the tube into an abscess even to the size of the patient's head. The distention is greatest at the distal end of the tube; rarely is the uterine end distended. Adhesions invariably bind the distended tube more or less firmly to surrounding structures.

In the Fallopian tubes the gonococcus has been repeatedly recognized in the pus contained within the lumen of the tubes and in the mucous lining. Morax and Raymond found the gonococcus in the superficial layer of the mucosa. Bumm found nests of gonococci in the mesosalpinx in one case, and Wertheim in two cases. In one of Wertheim's cases the tube was removed three months after the initial infection. Gonococci were found not only in the pus contents of the tube, but also in the intercellular spaces of the mesosalpinx, and in the plastic exudate covering the serosa. Doubtless this is an exceptional case, for in the tube, as in other parts of the genital tract, the organisms are usually confined to the mucosa.

### OVARY.

The Ovaries are attacked by the gonorrhoeal infection secondary to the tubes.

In the acute stage of the infection the ovary is uniformly enlarged and reddened. Abscesses, single or multiple, may form in the corpus luteum, follicles and connective tissue stroma.

In chronic gonorrhoeal ovaritis the organ is usually enlarged and firm in consistency by virtue of the increase in the amount of connective tissue. One or many of the follicles are distended, giving rise to what is termed cystic or follicular degeneration. In the follicles, corpus luteum or interstitial connective tissue spaces single or multiple abscesses may develop and these may attain considerable size. In all abscesses of the ovary, adhesions form about the organ and bind it to neighboring structures. Where abscesses do not exist, adhesions may or may not form. Not uncommonly the ovary is so enmeshed with the infected tube as to be unrecognizable.

The ovary is rarely, if ever, attacked by the gonococcus in the absence of a previously infected tube. Wertheim, in two cases, found groups of gonococci in the walls of ovarian abscesses. It is not possible to say whether the organisms reached the ovary by way of the tube, peritoneum, or broad ligament. It is probable that most of these ovarian abscesses take their origin in the corpus luteum, which in turn is infected from the tube.

### PERITONEUM.

Pelvic Peritonitis is a common result of gonorrhoeal infection. Peritoneal exudates follow closely upon the ini-

tial acute stage and may be found to occupy any part or all of the pelvic peritoneal cavity. The cul de sac of Douglas is the site of predilection, inasmuch as it is the most dependent part of the peritoneal cavity. In exceptional cases the exudate lies between the bladder and uterus and in front of the broad ligaments. Such exudates may be encapsulated in adhesions, coils of bowel, ligaments and pelvic organs at any point within the pelvic peritoneal cavity. The exudates may be serous, sero-purulent or purulent.

Peritoneal adhesions may follow a serous or purulent exudate or may develop independent of fluid exudates. They are found in greatest number about the appendages and back of the uterus. In their development they vary from delicate fibrillae to dense bands.

Localized pelvic and general abdominal peritonitis due to gonorrhoeal infection has been demonstrated very rarely by bacteriologic observations, though clinically it is well known. Bumm expressed the belief that the gonococcus could only live on mucous surfaces. Wertheim disproved this view and others have supported his experiments by clinical observations. Cases of general gonorrhoeal peritonitis are reported by Koehler, Frank, Cushing, Veit, and Menge. Hummer and Harris reported 7 cases and gave an analysis of 39 previously reported cases.

### PELVIC CONNECTIVE TISSUE.

Little is known of gonorrhoeal infection of the pelvic connective tissue. That gonorrhoeal abscesses do form in connective tissue is demonstrated by Wertheim, Dinkler, and Jadessohn, but the bacteriologic observations which have been carried on in cases of pelvic cellulitis of gonorrhoeal origin have led to great confusion.

Steinschneider and Schaffer experimented with pure cultures of virulent gonococci which they injected into the connective tissue. They observed no inflammatory reaction. The conclusions drawn were that the gonococcus will not develop a suppurative process in connective tissue. These experiments are in full accord with clinical observations.

When suppurative processes develop in the connective tissue of the pelvis in the course of a gonorrhoeal process it is probably due to a mixed infection, notably with the staphylococcus aureus and albus.

**URETHRA.**

In the urethra we find, during the acute stage, that the gonococcus advances by way of the intercellular spaces to the deeper structures of the mucosa and into the underlying connective tissue. As the acute stage merges into the chronic, there is a less diffuse distribution of the organism and of the leukocytes; the gonococci confining themselves to isolated areas in the superficial structures, particularly those areas which present to the unaided eye congested and ulcerated regions. Similar observations in the bladder were made by Wertheim.

**RECTUM.**

Baer's statement that the invasion of the rectum by gonococci is of frequent occurrence is confirmed by the observations of Jullien, who found the rectum involved 32 times in 429 cases of gonorrhoea (8 per cent).

The main sources of infection are coitus per anum and contamination from vaginal secretions through lack of cleanliness.

## COURSE OF GONORRHOEAL INFECTION

We may divide all cases into mild and severe. The difference lies not so much in the variation in the virulence of the germs, but in the localization of the infection. When confined to the urethra and cervix the course is mild, but increases as it extends above the internal os. When confined to the urethra and cervix, the acute stage is quickly passed and may be forgotten, hence the frequent finding of chronic urethritis and cervicitis without the knowledge of the patient. Such individuals may never consult a physician for the reason that they have no knowledge of their difficulties. It is the experience of the author that the internal os affords a barrier to the upward progress of the disease; that the disease does not incline to extend beyond the internal os unless excited to do so by mechanical means, such as the passage of a sound, curettage, excessive venery, and injudicious exercises. It is at the menstrual epoch and in the puerperium that extension of the infection is most liable to occur. Under the above conditions, a latent infection which gives rise to little or no disturbance may gradually or suddenly develop distressing symptoms. Pelvic tenderness and pain are complained of, the menstrual functions are disturbed, becoming profuse and painful, leucorrhoeal discharges arise, the functions of the bladder and rectum are disturbed and in a bimanual examination the uterus is found to be tender to pressure. Such developments in the presence of a latent infection are clinical evidences of the extension of the infection to points beyond the internal os.

Just as the internal os presents a natural barrier to the extension of a gonorrhoeal infection from the cervix to the body of the uterus, so the uterine end of the tube stays the upward progress of a gonorrhoeal endometritis. The same conditions which favor the extension of a cervical infection to the body of the uterus will favor the further extension to the tubes.

It is not the invariable rule that both tubes are involved though this is common. Furthermore, one tube may be more extensively in-

volved than the other. On the one side may be a pyosalpinx, on the other a catarrhal salpingitis or hydrosalpinx.

Functional disturbances are in direct proportion to the extent of involvement. When the cervix is alone involved, the menstrual functions are not disturbed while in gonorrhoeal metritis and salpingo-ovaritis, the menstrual periods are usually prolonged and painful. When the pelvic peritoneum is involved there is usually associated with the painful and prolonged menstrual periods, diffuse tenderness in the pelvis, a feeling of heaviness and fullness in the lower abdomen and more or less tympany.

Sterility is a common result of gonorrhoeal infection. Where the infection is confined to the cervical canal, sterility is not the rule though it is possible for the tenacious mucous discharges to mechanically obstruct the cervical canal and thereby produce a barrier to the spermatozoa. Gonorrhoeal endometritis in the chronic stage does not necessarily involve the endometrium uniformly. There may be sufficient normal mucosa to provide a resting place for the ovum and to permit of its development. Likewise when the tubes are involved, sterility is not inevitable. So long as the lumen of the tube is not completely occluded there is a possibility of the ovum finding its way into the cavity of the uterus. Martin, Bumm and the author have reported cases in which pregnancy followed upon a bilateral pyosalpinx. Tubal pregnancy has frequently resulted from gonorrhoeal salpingitis through failure of the impregnated ovum to pass through the tube into the uterus. Gonorrhoeal ovaritis and periovaritis may so alter the structure of the ovary as to prevent the escape of the ovum. The increase in the connective tissue of the stroma and the adhesions formed about the ovary offer the obstruction to ovulation and to the passage of the ovum to the tube.

### LATENT GONORRHOEAL PELVIC INFECTIONS.

Latent infection is but another and better name for auto-infection, a term first suggested by Semmelweis, who said: "In rare cases the decomposed animal organic material, which causes child bed fever when absorbed, is produced within the patient herself."

Now that child bed fever is universally recognized to be the result of microbial invasion of a puerperal wound, and not due to the absorption of decomposed animal organic matter; and furthermore,

that there can be no spontaneous creation of micro-organisms within the genital tract; but on the contrary, that these germs must necessarily have been introduced from without, we come readily to the conclusion that child bed fever is always exogenous in origin and never endogenous.

However, we do not always bear in mind the fact that the micro-organisms essential to the development of puerperal and non-puerperal infections of the pelvis not infrequently reside in the pelvic organs for an indefinite period of time without giving rise to local or general signs of infection; that after lying in this quiescent state for weeks, months or years certain conditions may supervene to increase the activity of these organisms causing them to multiply, to extend to adjacent or remote parts of the body, and to give rise to local inflammatory lesions or general toxemia.

We no longer speak of such a process as one of autoinfection, but rather as a latent infection.

I am persuaded that the profession in general does not give this subject due consideration, and as a consequence unwarranted responsibilities are assumed or imposed. So far as I am aware, nothing has been written in the English language on the subject save in occasional brief references. Yet the subject is of very practical importance and one which we must ever confront in our obstetric practice.

The value of bacteriological examinations of the uterine secretions is illustrated by a case of puerperal infection following an instrumental delivery done without the boiling of instruments or the washing of hands. A chill followed twenty hours after delivery and the temperature rapidly reached 104° F. The presumption was that the infection had been introduced at the time of labor, but a cover-slip preparation of the uterine secretions, taken from the cavity of the uterus, revealed a pure gonococcus infection.

The second case was unquestionably the result of a latent and localized gonorrhoeal infection of the urethra and cervix which, after labor, rapidly spread to the appendages and pelvic peritoneum. The physician in charge was clear in his diagnosis of an acute metritis, salpingitis and pelvic peritonitis, but had not connected the pathology with the history of a gonorrhoeal infection acquired by the hus-

band about seven months before his wife was delivered, and transmitted to her in the seventh month of her pregnancy.

Gonococci were found in the lochia, the uterus was tender and sub-involved, the left tube was distended with pus and there was a serous exudate in the pelvic cavity. The clinical history suggests that prior to labor the infection was confined to the urethra and cervix, and that within the first week of the puerperium it had reached the tube.

This case illustrates that a gonorrhoeal infection acquired after the third month of gestation does not usually extend beyond the internal os, that while confined to this limited area the patient may be ignorant of its existence; but that after labor the infection may rapidly pass by way of the endometrium to the tubes. In the non-pregnant state we find the tubes are seldom involved within several months of the initial infection, and as a rule the infection does not involve the tubes independent of pregnancy, menstruation or a local mechanical disturbance, such as curettage.

The third case was that of a woman who had given birth to twins six years ago. The labor was followed by sepsis with the pain and tenderness confined to the left side of the pelvis. Since that time she has continued to suffer from pain and tenderness in the left tube and ovary. Her following pregnancy was terminated four weeks ago and was immediately followed by increasing pain in the left side of the pelvis and the development of a low degree of fever. Three weeks after the labor I found the left tube distended and tender with an evident involvement of the uterus and appendage on the opposite side. The explanation for the present infection probably lies in the lighting up of the latent infection in the left tube.

Graefe reported a case in which the tubes were invaded by the gonococcus twelve hours after labor. This early involvement of the tubes in puerperal infections should suggest a latent gonorrhoeal infection, resident in the uterus.

The bacteriology of the normal genitalia of women has been a subject of controversy from the beginning of bacteriological research, and is still a mooted question. All observers agree that no micro-organisms are to be found under normal conditions above the external os. That they exist in large numbers in the vagina is generally conceded, but to what extent, if any, these micro-organisms are

pathogenic is an unsettled question. The consensus of opinion among the highest authorities such as Kroenig, Menge and Whitridge Williams, is that while pathogenic micro-organisms may be found in the healthy vagina, they cannot long exist and still earlier lose their virulence. The importance of these observations is obvious, for with an unobstructed passageway from the vagina to the cavity of the uterus, from the uterus to the tubes, and from the tubes to the free pelvic and general abdominal cavity there would be constant danger to life and health. Happily the micro-organisms, both non-pathogenic and pathogenic, which exist in large numbers and at all times at the vulva are, under normal conditions, prevented from invading the upper genital tract by the bacteriocidal influence of the vaginal secretion and the protective covering of stratified squamous epithelium which covers the vagina and vaginal surface of the cervix. Once having gained access to the cervical canal the uterine secretions are more favorable to their development and activity, and the delicate layer of columnar epithelium with its innumerable invaginations into the deeper structures in the form of glands provides little defense against infection.

The two types of infection which comprise no less than 90 per cent of all cases are puerperal and gonorrhoeal. So nearly do these two forms of infection constitute the sum total of all pelvic inflammations that to exclude the one is to accept the other as the probable explanation for the lesion. It must not be overlooked, however, that puerperal infections are in full 14 per cent of cases due to the gonococcus acquired in or near the time of labor, or lying dormant in the genital tissues for an indefinite time as a latent infection which is awakened to renewed activity by the congestion and trauma incident to pregnancy, labor and the puerperium. And full 25 per cent are mixed infections in part due to the gonococcus. In the Dresden clinic, in 1898, there were 2,300 labors, and of those cases in which fever had occurred, the gonococcus was demonstrated in the lochia of one-fourth of the entire number. It is not to be inferred that the gonococcus was invariably the cause of the puerperal fever; this organism may have had nothing to do with the general infection in a proportion of the cases, or other species of micro-organisms may have contributed to the infection. In a case of puerperal infection recently under my care the gonococcus was found in the lochia and the ty-

phoid bacillus in the blood. In 1887 Veit pointed out the significance of latent infections of the endometrium as causes of puerperal infection, and it has been repeatedly demonstrated that pyogenic organisms may exist in the decidua during pregnancy without giving rise to local or general manifestations during the period of gestation, but become virulent and destructive shortly after labor in the presence of an active blood supply, of wide open blood and lymph channels and more than all of injuries to the tissues. Albert believes such instances of puerperal infection are not rare, and refers to 6,500 cases of labor in the Dresden clinic, in which there were 183 cases of puerperal sepsis with six deaths, and in all these cases there was no possible means of contamination to account for the infection. It may be said, without fear of contradiction, that Albert cannot justify his assertion that the infection was not conveyed to the genital tract during or after labor, much less that the infection did not occur shortly before the admission of the patient to the clinic. It is therefore not possible to say in any given case of puerperal infection that the infection had pre-existed in the tissues and was not carried there prior to the time of labor, during labor or in the puerperium. The means of contamination are too varied and our principles of asepsis and antisepsis have not attained to that degree of perfection to justify such a claim. I would particularly emphasize the importance of seriously considering latent infections of the uterine appendages, the veriform appendix, kidney and bile tracts when associated with pregnancy, for experience teaches us that as a result of labor these latent infections become active and not infrequently destructive. So common is this occurrence that it should be our rule in assuming the responsibility of a case of pregnancy to look to the possible presence of these lesions.

As evidence of the frequency of gonorrhoeal infection complicating pregnancy Saenger observed 389 cases of pregnancy, in 100 of which there was a gonorrhoeal discharge.

That a latent gonorrhoeal infection residing in the genitalia does not always result in puerperal sepsis is shown by the statistics of Steinbuckel who observed a normal puerperium in 274 cases, 18 per cent of which contained gonococci in the vaginal secretion. Again, in a total of 190 cases of Granz, Staehler, Walthard, Winkler and Buckhardt, all of them passing through a normal puerperium, there were 41 per cent in which micro-organisms were found in the uterus.

In Leopold's clinic 25 per cent of puerperal sepsis was of gonorrhoeal origin.

That the uterus may be apparently normal and yet contain micro-organisms was demonstrated by Winter who examined thirty apparently normal uteri and found micro-organisms in eight; Brant made similar observations.

Almost all latent infections of the genitalia which have been observed have been gonorrhoeal. Emanuel recorded two abortions in which certain cocci (not gonococci) were found in the endometrium, and in another case bacilli were found. Latent genital tuberculosis is known to have been awakened by the incidence of labor and to result in a general miliary tuberculosis.

If a latent gonorrhoeal infection in the husband may infect the wife, and if a latent infection in the wife may become virulent in the puerperium, and with disastrous results, the questions naturally arise: First. When can a man who has or has had gonorrhoea safely marry? Second. When is it safe for a woman to bear children after having been infected with the gonococcus?

The answer to both these questions is emphatic and uncompromising, that the time for marriage and for child bearing is not until after repeated bacteriological examinations there is demonstrated to be an entire absence of gonococci; this pathologic fact must be accepted as the sole basis of the physician's decision. This rule must be enforced in the interest of the mother and child; the former who is thereby imperilled in health and in life, and the latter who is exposed to a probable infection of the eyes.

I have repeatedly demonstrated the gonococcus in the urethra where there was no visible secretion. As a rule, however, these organisms, coming from the urethra in the absence of a purulent secretion, have lost much of their virulence. Previous to the discovery of the gonococcus by Neisser and the adoption of simple means of detecting the organism, it was believed that a gonorrhoeal urethritis was terminated when the discharge disappeared. Laboring under such a delusion, it was no wonder that the profession was unwilling to accept the statement of Noeggerath that the gonococcus existed the lifetime of the individual and could transmit an infection long after the disappearance of all symptoms. Now we are all but ready to say Noeggerath was right when he

said the gonococcus can exist in the tissues throughout the lifetime of the individual, and at any time under favorable influences the infection may light up into what appears to be a new and acute infection, or may transmit a virulent infection without itself becoming manifest.

The discharge accompanying a chronic gonorrhoeal urethritis or endometritis is proved to be virulent only when the microscope reveals the presence of gonococci or when sexual intercourse results in infection. The amount of the discharge or its constancy does not indicate the degree or virulence. We have demonstrated the presence of the gonococcus in the absence of a discharge and we have failed to detect the gonococcus in the presence of a chronic discharge. As many as a dozen examinations of the secretions have been necessary to find the gonococcus. The most favorable time is immediately after menstruation and in the early puerperium.

Individuals are observed to infect others, yet apparently are themselves immune to infection. The explanation lies in the presence of a chronic gonorrhoeal infection, in the absence of all clinical signs. In the first individual the gonococcus had little virulence, but when transmitted to sterile tissues it assumed an active rôle.

The so-called "one-child sterility" is accounted for in large measure by the extension of a pre-existing gonorrhoeal infection during the puerperium; the infection which was confined to the cervix and urethra is prone to extend to the corpus and tubes, and will then almost certainly result in sterility.

I am of the opinion that practically all cases of infection following complete spontaneous abortions, in the absence of instrumental and digital interference, are to be accounted for by latent infections pre-existing in the endometrium. We have seen that one case in seven of puerperal sepsis, following labor at term, is gonorrhoeal in origin, and essentially all of these cases were latent in the tissues prior to labor. The conditions which favor the development of puerperal sepsis in the presence of a latent infection are prolonged labor, lacerations and intrauterine manipulations.

Furthermore, it is highly probable that the acute inflammatory

attacks which are the result of so-called menstrual congestion are but the awakening of a latent infection.

### GONORRHOEAL PUPERAL INFECTION.

Cumston, in his valued contribution on The Gonorrhoeal Puerperium (Am. J. of Obst., Oct. 1899) states that "of all the acute infectious diseases, it is certainly gonorrhoea which plays the most important part in the complications arising during the puerperium." The profession has been slow to appreciate this fact for the reason that the rôle played by latent gonorrhoeal infections was little suspected until Noeggerath published his classic paper in 1878. The observations of Noeggerath were purely clinical and were not widely accepted for the reason that they lacked the necessary proofs afforded later by Neisser in the discovery of the gonococcus. Now every careful observer of large obstetric experience is keenly aware of the frightful prevalence of gonorrhoeal puerperal infections.

Cumston made an exhaustive study of the statistics and arrived at the deduction that more than twenty-five per cent of pregnant women are afflicted with gonorrhoea.

Bumm argued that the puerperal process was extremely favorable to the development of the gonococcus. He arrived at this conclusion by the finding of large quantities of gonococci in the lochia.

von Steinbuechel made a series of observations, both clinical and bacteriological. There were 9.3 per cent of gonorrhoeal puerperal fever as opposed to 9 per cent of puerperal fever due to micro-organisms other than the gonococcus. The author is in accord with the views of Saenger and Bumm, who state that gonorrhoeal symptoms are common in the late puerperium and rare in the early stage. From a study of the reports of various authors it is probably a fact that no fever arises so long as the infection is limited to the cervix. Kroenig concludes that gonorrhoeal endometritis will in itself suffice to create fever. No personal observations confirm this statement. All agree that gonorrhoeal symptoms become more and more manifest as the infection extends upward through the genital tract.

Veit attempts to explain the rapid extension of a gonorrhoeal infection in the puerperal uterus on the hypothesis that the tissues are greatly relaxed.

That the gonococcus may extend upward and invade the entire genital tract, and that in isolated cases it has been known to extend

over the general peritoneum and to distant parts of the body by metastasis, is now generally recognized. Hence it follows that both localized and general puerperal infections are known to be the result of gonorrhoea just as truly as of other pathogenic micro-organisms.

Saenger believes it possible for the gonococcus to grow during pregnancy and result in hemorrhages and abortions. Fruehenholz finds the explanation of acute febrile symptoms early in pregnancy in the presence of growths of the gonococcus. Fehling believes that the tubes are commonly invaded during pregnancy.

As to the symptoms arising from gonorrhoeal infection in the puerperium there is a great diversity of opinion due to the fact that no constant course is pursued.

These symptoms have arisen prior to labor, during labor and from the first day of the puerperium to the end of the second month after labor. They are often mild and transitory, and again severe and persistent.

Fred J. Taussig of St. Louis has published in the American Gynecology, April, 1903, a most complete exposition of the symptomatology and treatment of gonorrhoeal puerperal fever. The author is in full accord with his statements and takes the liberty of quoting extensively from this classical contribution.

Fred J. Taussig, M. D., in writing on Gonorrhoeal Puerperal Fever, gives the following most excellent discussion:

“So recent has been the recognition of this form of puerperal fever and so few have done careful work upon this subject that we still remain without a well-defined clinical picture of the disease. It is for this reason that I have presented this part of my subject in some detail.”

“For the first five days after delivery there is usually no disturbance of any kind, on the part of the mother. Calmann occasionally observed a slight rise in temperature to 100.5° on the third or fourth day. This was also noted in all of my five cases. There is usually a corresponding slight increase in the pulse-rate, but on the whole, the patient feels perfectly well, unless it be for some sensitiveness about the cornua of the uterus. As a rule, however, the puerperium seems to run a perfectly normal course for the first six days. The lochial discharge is the first thing to call the physician’s attention to some abnormal process in the uterus. By the sixth

day it has become very profuse and has a peculiar, rather disagreeable odor, differing from the foul smell of retained placental tissue and also from the stale odor of normal lochia. In my own observations, I was particularly struck with another feature of the discharge, the large amount of mucous present—giving it a glairy appearance and tenacious character. Its color is usually more yellow than normal. Characteristic, too, is its unusually irritating and biting nature, often giving rise to considerable soreness about the wounds of the external genitals and occasionally even causing an intertrigo."

"At the end of the first week, or the beginning of the second, we have the first general evidence of an infection. There are usually rigors or even in some cases, a distinct chill followed by fever. Within 24 hours the temperature has risen to 103° to 104°; the pulse increasing to 100 to 110 per minute, but full and regular. There is often headache, aches in the limbs, general malaise, rarely nausea or vomiting. On being called to the patient, we usually find her suffering from intense colicky pains in the lower abdomen. There is considerable tympanities and extreme sensitiveness over the entire abdomen. The fever will usually remain constantly high for about two or three days without the irregular rise and fall that is so typical of streptococccic infection. Then it will gradually subside to normal."

"The pulse which has always been comparatively infrequent, returns to normal. The tongue is moist. The patient eats heartily and sleeps well. The abdomen is soft, but in the region of the uterus and tubes there is still considerable tenderness and in some cases the swollen tubes can be palpated through the abdomen."

"Such is the typical course of a severe attack. Naturally, many a case runs a more benignant course and is then often overlooked. There may be fever for but a single day and not over 101°. This is particularly true of the cases in which the first symptoms may be so mild as to permit of the patient being up and around. It is held by Bumlin, Saenger and Strassmann that only the late mild form is due to the gonococcus alone; that all cases in which a high fever occurs within the first eight days, are due to mixed infection. This view is opposed to the findings of Kroenig and Calmann. Of Cumston's five cases, two show a high fever as early as the fifth day. Particularly instructive in this connection are Cases 3 and 4 of my

series, in which upon the seventh and eighth days respectively a temperature of 103° was recorded. Here the secretion was obtained directly from the uterine cavity under aseptic conditions, and the fact that the careful examination of several specimens showed the presence of gonococci in pure culture, is surely conclusive proof that here the symptoms cannot be explained on the basis of a mixed infection. Even sapremia could be excluded in these cases, as in both an intra-uterine examination revealed the absence of all placental remnants or old bloodclots.

'The course of gonorrhoeal puerperal fever, as compared with infection by other bacteria, is, as has been indicated, a very mild one. The fever usually lasts but a few days. The patient soon regains strength and appetite and as a rule hardly considers herself ill. The process is by no means, however, so quickly eradicated. It usually enters upon a sub-acute or chronic state in which the patient, besides suffering from a copious purulent discharge, has occasional attacks of severe pain and may suffer from persistent uterine hemorrhages. This often incapacitates them from work and where a collection of pus has formed in the tube or ovary, may require operative interference. A point that Fehling lays stress on, is that puerperal gonorrhoeal salpingitis is usually one-sided. He considers this of diagnostic importance and to those accustomed to regard one-sided puerperal adnex-tumors as streptococccic in origin, rather subversive of former ideas. A parametritis is rarely seen, although Wertheim had demonstrated that gonococci can cause such an infection of the pelvic cellular tissue. Localized pelvic peritonitis is frequent on the other hand, and Olshausen has recently reported a reliable case of fatal general peritonitis following the rupture of a gonorrhoeal pus-sac. Such cases, however, must always arouse strong suspicion of a mixed infection.

"More remote sequelae are also recorded. Dabney and Harris of Johns Hopkins, report a case of fatal endocarditis in which gonococci were found on the valves. Similarly Halle speaks of a patient with gonorrhoeal septicemia in which the endocardium was attacked. Arthritis is another not infrequent complication. The knee-joint is here the favorite site, though polyarthritis is also occasionally seen. For the child there is the increased danger of ophthalmia. A careless mother or nurse may readily cause such an infection post

partum. The fact that none of the five children in our cases developed any eye trouble, may be partly ascribed to the comparative freedom of the genital tract from gonococci previous to and during delivery; partly to the prophylactic use of the 2 per cent silver nitrate solution, according to Credé.

"In diagnosis the differentiation will be found streptococcal infection on the one hand and from sapremia on the other. From the former, gonorrhoeal puerperal fever is distinguished by its somewhat later onset (seventh to eighth day instead of fourth to fifth day), by the moderate degree of fever (103° in contrast to 105°), by the absence of signs of severe intoxication and by the regular and proportionately slow pulse. After 24 to 48 hours all doubt in the diagnosis is usually removed by the gradual remission of the fever. In sapremia we usually have a history of retained placental tissue, a foul-smelling discharge often attended by considerable bleeding, or at times a sudden blocking up of the lochia, and a large, soft, and rather insensitive uterus. In contrast thereto, we have in gonorrhoeal cases, a free yellowish, glairy discharge and a small, rather firm, but exquisitely tender uterus. In typical cases, therefore, the clinical diagnosis of gonorrhoeal puerperal fever is not so difficult. In all cases we must rest our diagnosis upon the microscopic examination of the lochia. Frequent careful examination of the lochial discharge is, therefore, an absolute necessity in the diagnosis of every case of fever in the puerperium.

"The most essential feature in the treatment of these cases, as in that of other gonorrhoeal affections, lies in prophylaxis. And this prophylaxis should begin at a very early date. Every pregnant woman should be examined with a view to detecting a latent gonorrhoea. Here the history of the case is usually of minor importance. Increased vaginal discharge, frequent, even burning urination, are so often found accompanying normal pregnancy, that only where these symptoms are very marked, do they possess any value. The objective findings are the essential ones. Pressure should always be made upwards against the urethra, in the digital examination, and if any secretion be present, no matter how slight, it should be carefully examined for gonococci. If the meatus of the Bartholinian glands be reddened or condylomata acuminata present, it must al-

ways be strong presumptive evidence of a gonorrhoea. In doubtful cases we are justified in examining the cervix and obtaining some of its secretion for microscopic investigation. If the result is positive, treatment should begin at once. Just how far this treatment can safely go is a matter of opinion. Many will prefer to confine themselves to the giving of luke-warm douches and alkaline diuretics. Others, like Calmann, are not afraid to venture upon more vigorous treatment—such as the application of ointments to the cervix. On one point all are agreed, however, i. e., that condylomata should not be cauterized or cut during pregnancy, as this almost invariably provokes premature labor pains.

“During labor, prophylaxis is of even greater importance. If there are evidences of a gonorrhoea, all internal examinations are to be avoided, unless special indications arise. Should such an examination prove necessary, it would be well to precede it by an antiseptic vaginal douche. This douche should never be omitted, where operative interference has been deemed necessary. Naturally, one will only resort to such operative measures when absolutely compelled to, for every intra-uterine manipulation in these gonorrhoeal cases is fraught with considerable danger. Above all does this apply to the manual delivery of the placenta. Small bits of placenta or membranes should be allowed to come away of themselves. Whenever an intra-uterine manipulation has been made, it should be followed by weakly antiseptic intra-uterine irrigation.

“In the puerperium our efforts must be directed to the careful examination of the lochial discharge. Should the number of gonococci be markedly increased, even if no symptoms of an ascending process have developed, we must order absolute rest in bed for from 14 to 16 days and frequent hot antiseptic vaginal douches. Of course, all prophylaxis may be of no avail but at any rate we can feel that we have done all in our power to prevent the inoculation of the gonococci upon new fields.

“In the treatment of this condition we come upon the greatest variety of opinions. In our series a rather vigorous plan of procedure was adopted. In all cases either an intra-uterine douche or curettetment was undertaken. In spite of the apparent success of this method in Cases 3 and 4 I would be far from advocating it

without reserve. To give an idea of the wide difference of opinion on this subject, I cite the following:

“Runge (‘Geburtshilfe,’ 4th edition, p. 547): ‘Absolute rest is of more service than active measures such as douches, which are liable to further the extension of the process upwards.’

“Fehling (‘Physiologie und Pathologie des Wochenbettes,’ p. 165): ‘As a rule, vaginal douches together with ergotin internally will produce a sufficient decline in the fever; if not, then an intra-uterine douche will give comparatively good results, since the gonococci certainly do not penetrate so deeply into the uterine wall as streptococci.’

“Davis (‘American Text-Book of Obstetrics,’ p. 239): ‘During the puerperal period the occurrence of septic inflammation in and about the uterus should be treated promptly by intra-uterine antiseptics, or as soon as possible by abdominal incision. It is folly to treat the insidious ravages of gonorrhoea in the connective tissue, the peritoneum and contents of the pelvis occurring after labor by any but prompt surgical measures. Exploratory abdominal incision patient is to stay in bed for from four to seven weeks.

Calmann (‘Diagnose und Behandlung der Gonorrhoe beim Weibe,’ p. 46): advises absolute rest, the application of cold to the abdomen and if necessary, opium in the acute stage of ascending gonorrhoeal puerperal infection. He warns against even vaginal douches until all fever or pain on pressure has disappeared. The patient is to stay in bed for from four to seven weeks.

“As yet, insufficient data has been collected to allow the deduction of positive conclusions as to treatment. The general tendency seems, however, to be against the radical ideas of such men as Davis. This is in accord with results in other forms of acute gonorrhoea. Absolute rest is of the greatest importance but it conflicts sometimes with the proper removal of the purulent secretions. In all of my cases a considerable quantity of pus collected within the uterine cavity and distinct relief was experienced when the cavity was emptied. I cannot imagine that a single antiseptic intra-uterine douche, if care is taken that the return flow is not checked, involves more risk of a salpingitis, than if the secretion is allowed to stagnate in the uterine cavity. Hence, I would be in favor of giving such a douche in all cases in which vaginal douches alone have not effected

relief of pain and fever. As far as the antiseptics used in the intra-uterine douches are concerned, bichloride, even in 1-6000 dilution, may give rise to fatal intoxication—hence, lysol in  $\frac{1}{8}$  to  $\frac{1}{4}$  per cent solution, or 50 per cent alcohol, is, on the whole, preferable.

“Curetttement, on the other hand, involves too much risk of a general infection. By such a procedure, we open up the blood and lymph channels and gonococci may thus be carried to the joints, giving rise to a most troublesome arthritis, or what is worse, be implanted upon the endocardium and produce a fatal cardiac affection. Whenever a localized collection of pus can be made out in the pelvis, and this collection does not show a tendency to absorption, vaginal incision and drainage will have to be resorted to. Calmann’s suggestion to keep the patient in bed, for four to seven weeks, is good, but difficult to carry out in practice, as the patient usually feels so well that she cannot see the necessity of it.”

## DIAGNOSIS

We are able to arrive at a clinical diagnosis of gonorrhoeal infection in a large number of cases by a consideration of the history without a physical examination. Such a diagnosis is at best imperfect, in that it no more than establishes to a high degree of probability the existence of gonorrhoea in the genitourinary tract, without any exact knowledge of the extent of the infection. For example, a child nursed by a mother or maid who is known to have a gonorrhoeal discharge acquires a leucorrhoea with signs of inflammation about the vulva; a recently married woman experiences a leucorrhoea with burning pain on urinating, and it is learned that her husband at one time had a gonorrhoeal infection, though there has possibly been no evidence of it for months and years; a woman who was previously free of all complaint submits to illicit intercourse and in a few days suffers from painful urination and leucorrhoea; such histories lead almost certainly to the diagnosis of gonorrhoea.

Grave mistakes have been made in diagnosis by assuming that no infection exists because the usual complaints of an acute infection do not appear in the history. It is to be remembered that a woman may acquire a gonorrhoeal infection without her knowledge, and in the absence of all local or general symptoms. Such an affection is confined to the lower genital tract and either disappears spontaneously within a variable period of time, or is subsequently caused to extend higher in the genital tract, where with each advance from the cervix to the corpus, from the corpus to the tubes, and from the tubes to the ovaries and peritoneum, the general and local disturbances are exaggerated.

The diagnosis of gonorrhoea in the female is much more difficult than in the male for the reason that the chief clinical manifestation of infection of the mucous membranes is the altered secretion. In the male urethra a secretion is almost uniformly gonorrhoeal in origin while in the female the secretions are due to diverse causes. Furthermore the genito-urinary apparatus of the female is far more

complicated than in the male, hence the greater difficulty in determining the presence and extent of the infection.

In presenting the diagnosis of gonorrhoeal infection in the female, the logical procedure will be to present the clinical manifestations and physical signs of the infection as found in the various organs and in the order of their frequency and priority.

### **METHODS OF PROCEDURE IN THE EXAMINATION OF WOMEN.**

Neisser gives the following suggestions:

“1. The urethra. Where there is an abundance of secretion, the preparation of the microscopical specimens presents no difficulties. I should like to recommend, however, for all cases the use of long-handled and blunted “sharp spoons” which can be thoroughly heated, for introduction into the urethra for the purpose of scraping off the most superficial epithelial layers, especially if the possibility is at all present that the patient has through micturition or expression discharged the secretion previously contained in the urethra.”

“With an abundant purulent secretion it is well to consider that in women also there are post-gonorrhoeic forms which carry gonococci no longer, and uro-gonorrhoeic urethritis.”

“If gonococci are really present, they lie here often extracellularly, embedded in mucus or vase-like on large epithelial cells.”

“2. The duct of Bartholin’s glands. Even in quite chronic cases the same is frequently the seat of residual gonococci. If the opening shows the red macula described especially by Sanger, this clinical sign alone points to a gonorrhoeic remnant; but there are frequently gonococci in the expressed mucus though all clinical signs are wanting.”

“Similar importance should be attached to the large mucous glands surrounding, like a wreath, the orifice of the urethra.”

“3. The cervical canal. Here it is also advisable after the removal of the mass of mucus, which flows sometimes abundantly, to enter the canal with an instrument and to prepare microscopical specimens out of the substance lining the wall.”

“An examination of the vaginal secretion is of use only in quite young persons just married, as in adult women who have already

frequently had sexual intercourse, the vagina itself is hardly ever the seat of gonorrhoeic processes. Of course it is possible for gonococci to descend from the uterus into the vaginal mucus; but then it is more to the point to subject the cervix and eventually the uterus itself directly to an examination for gonococci."

"4. An examination of the uterus itself becomes necessary in some cases where it is important to ascertain whether a gonorrhoeic endometritis is present. Apart from the technical difficulties which every examination of the uterus involves, it is to be remembered that only in comparatively rare cases is it possible to apply any local treatment to the uterus direct. It may become necessary to establish the point if in spite of continued treatment of the cervical canal gonococci still continue to be present in the cervix preparations. In such cases it might eventually be best to discontinue the treatment of the cervix, if it is found that the body of the uterus has already become infected."

"If in a case where gonorrhoea is suspected or if in the course of treatment no gonococci are found in the secretion from the cervix or uterus respectively, it is nevertheless always necessary to make another examination in connection with the menstruation period. Frequently one finds in such a case gonococci which have, so to speak, been provoked into action and which during the intervals between menstruation were too scanty to be recognized, or which did not even, perhaps, form part of the secretion."

"5. As regards the rectum, its examination will be undertaken in every case of gonorrhoea of the genitals where there is some rectal irritation, so as to be on the safe side, especially where the patient is not excessively scrupulous about her personal cleanliness, and the discharge is very profuse."

### GONORRHOEA OF THE URETHRA.

Gonorrhoeal urethritis is frequently observed in the acute stage. In six to ten weeks it is often possible to regard the patient as fully recovered from the urethral infection. As compared with the male urethra, chronic gonorrhoeal urethritis in women is exceptional.

The acute attack is ushered in by a tickling and burning sensation before and after urinating. There is a transparent secretion,

to which are added pus cells, desquamated epithelium, and gonococci, which by the end of the third day cause the secretion to be thick and yellow. There is tenderness along the course of the urethra, and not infrequently in the bladder. Separating the labia with the fingers, the meatus appears red and swollen, and from the urethra may be expressed a drop or more of pus. In three or four weeks the urethra usually appears normal, though a drop of pus can sometimes be expressed by stripping the urethra. In a small proportion of cases the lesion passes into a chronic stage, in which the urethra becomes firm from thickening. Through the endoscope part or all of the urethra appears swollen, having little or no secretion. Strictures are seldom formed. Exacerbations, with all the usual manifestations of a recent acute infection, are the rule. These exacerbations can usually be explained by the presence of gonococci in the crypts near the meatus. From these crypts pus can often be expressed which contains gonococci in the absence of an apparent lesion elsewhere in the urethra.

In the acute stage the patient is compelled to urinate frequently. Pain is universally occasioned and may not only be referred to the urethra but to the bladder as well. These complaints are as a rule transitory, lasting at most but a few days to a month. At the end of three or four weeks not only have the subjective symptoms disappeared, but very often there are no objective evidences of the infection in the urethra. It is unusual for the infection to reside in the urethra longer than ten weeks and the majority is not so persistent.

In a small percentage of cases the acute stage passes over into the subacute and chronic. In the chronic stage of gonorrhoeal urethritis all subjective symptoms are commonly absent save in the periods of acute exacerbation. The diagnosis then rests upon the detection of a urethral secretion stripped from the meatus and then only is this secretion known to be infectious by the detection of the gonococcus. It is not enough for a positive diagnosis to find a urethral secretion; this alone is highly presumptive, but a diagnosis that admits of no doubt must be based upon microscopic findings.

In the acute stage, and more rarely in the chronic stage of urethritis, the first of the urine voided is clouded with the presence

of pus; the second portion is clear unless the bladder is also infected, when the latter portion will also be clouded with pus.

Paraurethral abscesses may form about the meatus secondary to the involvement of Skene's ducts. These abscesses seldom exceed in size a cherry stone. They are of a red color, very sensitive to pressure, and may open spontaneously into the urethra, vagina, or upon the vulvar surface. A fistula is thereby established which will usually close spontaneously. In the abscess, gonococci are found either as a pure culture or together with other pyogenic micro-organisms, notably the staphylococcus pyogenes aureus.

Pressure on the orifice may cause pus to exude from the follicles about the meatus (Skene's ducts). The impression is often gained that the pus is from the urethra but the fallacy can be demonstrated by instructing the patient to urinate before expressing the pus. By so doing the urethra is cleansed of all purulent secretions and the pus can be seen to exude from fissures at the side of the urethral opening. By the distention of the follicles the meatus becomes unsymmetrical and the mucous membrane over the follicles is reddened. Slight pain on pressure is the only symptom of this affection.

The extension of the gonorrhoeal infection to the bladder, ureters, pelvis of the kidney and kidney occurs but rarely. Bumm, in his extensive experience, has never observed a case of gonorrhoeal cystitis in the absence of other infectious micro-organisms. He refers to a case of Wertheim's. Gonorrhoea of the ureters has been observed many times. Howard Kelly reports a case of stricture of the ureter following upon a gonorrhoeal pyelitis.

### **GONORRHOEA OF THE VULVA.**

Gonorrhoeal Vulvitis is not uncommon in childhood, at a time when the epithelial covering affords little protection. During the period of sexual maturity gonorrhoeal vulvitis is rare, because of the protection afforded by the epithelium. It is said by some authorities that chronic gonorrhoeal vulvitis does not exist, because of the rapidity with which healing takes place. The vulva is usually infected secondary to the endometrium and urethra; the epithelium becomes macerated by the secretion and then infected. In acute gonorrhoeal vulvitis the tissues are deeply congested and the surface is

covered with pus or a pseudo-diphtheritic membrane. Underneath the secretion, superficial or deep ulcers may form; they are sensitive and bleed to the touch. The pus accumulates in the fossa nivalcularis and covers the entire infected surface. The hymen is swollen and red. Eczema of the labia and neighboring skin arises from lack of cleanliness. The labia minora may be so oedematous as to protrude beyond the labia majora. The vestibule may be swollen, velvety or granular with deep red patches and papillary elevations. The vulvar glands may be infected and transformed into numerous small abscesses containing gonococci. Associated with these changes are sensations of heat and burning about the external genitals, burning on urinating, and embarrassment in walking and sitting. These subjective symptoms usually disappear in three to five days and within two weeks little or no trace of the lesion remains. Healing is slower in childhood and in old age.

Chronic vulvitis, though rare, does exist and is very often localized particularly in the glands of Bartholin and in those of the vestibule. The diagnosis can be readily made from the above symptoms and local findings. It is essential to look for the complicating inflammatory lesions in other parts of the genito-urinary tract.

*Gonorrhoeal bartholinitis* is found in all stages of the disease. The Bartholinian gland has been observed to be infected within 14 days of the original infection, but the rule is that weeks and months intervene before these glands are involved. Both glands are commonly infected, though one usually precedes the other. The position and size of the outlet of the gland have something to do with the time and frequency of the infection. According to Bumm, the infection is confined to the mouths of the glands and does not extend to the deeper portions. Undoubtedly such is the rule, but it cannot be considered invariable. It is said that the secretions of the gland provide immunity. This statement may be accepted as the probable explanation of the infrequency with which the depth of the gland is involved. The outlet of the gland becomes red and swollen. These maculas (*maculae gonorrhoeica* of Saenger) are regarded as highly diagnostic. Gonococci may or may not be found in the secretions of these glands. When the gland is enlarged, it is felt in the labia majora as a spindleshaped or round body, varying in size to that of

a hen's egg, tender and sometimes fluctuating. It is possible for the glands to be infected without palpable enlargement.

Pus may extrude from the duct by pressure upon the distended gland. The beginning of suppuration is generally marked by chills and rise of temperature, with increasing pain of a throbbing character.

The abscess may discharge upon the inner surface of the labia; rarely, it may perforate the capsule of the gland and gravitate into the perineum or rectum; in this manner fistulae may develop. The discharged pus is bloody and foul smelling. Healing is usually prompt after rupture.

### **GONORRHOEA OF THE VAGINA.**

Gonorrhoeal vaginitis as a primary lesion is exceedingly rare, and seldom reaches the chronic stage. The explanation lies in the protection afforded by the pavement epithelial covering and the rapidity with which lesions of the vagina heal. The finding of the gonococcus in the vagina does not signify gonorrhoeal infection of the vaginal tissues. They come, rather, from the urethra and uterus, and lie in the vaginal secretions without attacking the tissues. To demonstrate the absence of gonococci in the vagina the Schultze method may be employed. This consists in thoroughly cleansing the vagina with douches, then inserting a tampon of sterile absorbent cotton against the external os. If the secretion which collects below the tampon is free of gonococci, while that which collects on the tampon is contaminated, the infection is demonstrated to be confined to the uterus and possibly the appendages. These uterine secretions may cause swelling and mottling of the vaginal mucosa.

In acute gonorrhoeal vaginitis the temperature may be elevated, physical exertion causes some distress, and to the examining finger the vagina is hot and tender.

The secretion is at first mucous, later purulent and irritating. Vulvitis, intertrigo and eczema of the vulva, inner aspect of the thighs and groin may be caused by these secretions. The caruncles become swollen, reddened and eroded. When possible to inspect the vaginal mucosa, there may be seen superficial erosions which bleed easily to the touch. Deep red granules the size of a hemp seed are

described by Finger, giving the surface a granular appearance. This form is most often seen in pregnancy and in poorly nourished individuals. Healing is usually complete within a month, but relapses are not infrequent, particularly during menstruation and pregnancy. Bumm states that he has never seen a case of chronic gonorrhoeal vaginitis.

*Gonorrhoeal metritis* is found in the acute and chronic stages. The uterus is a favorite site for gonorrhoea. In the absence of the gonococcus in the leucorrhæal discharge it is impossible to diagnose gonorrhoeal metritis, because the general findings are identical to those due to other infections of the uterus.

The cervix or a part of it may be alone infected, or the entire uterus may be involved. Formerly it was believed that the infection was confined to the endometrium, but we have learned from Wertheim that gonococci may be found even to the serious covering of the uterus.

*In acute gonorrhoeal metritis* involving the cervix (acute cervicitis) the lips of the cervix are swollen, congested, sensitive, and bleed when handled. From the external os there exudes a mucopurulent secretion which contains the gonococcus. Follicles containing pus may be formed from the glands about the external os. The vaginal discharge may be the only complaint. There may be burning pain from an irritated vagina; backache and pain in the groin and hypogastrium are frequent accompaniments, and the temperature may be elevated. So long as the infection is confined to the cervix there may be an absence of all symptoms and the patient may not be aware of her condition.

When the uterine body is invaded the foregoing clinical features are exaggerated. Bimanual examination reveals a uterus tender and possibly slightly enlarged. An anesthetic may be required because of extreme tenderness. The consistency of the uterus may be somewhat increased and the body less movable upon the cervix than normal. Not all individuals suffer equally. It is said a multipara suffers less than a nullipara. The rapid recession of the local and general signs of acute infection may be regarded as a characteristic of gonorrhoeal infection.

*Chronic gonorrhoeal metritis* is so varied and oftentimes obscure in its clinical manifestations that the true nature of

the infection, and even the presence of any sort of infection, might be overlooked without systematic bacteriologic examinations. All the usual symptoms may be wanting. A careful examination of the uterus may reveal no change in its size, mobility, and consistency. There may be no undue sensitiveness and an absence of a visible secretion. Yet the gonococci may be found in the transparent, viscid secretion of the cervix. Chronic gonorrhoeal metritis has as its all but constant sign a mucous or mucopurulent discharge. Erosions are often seen on the cervix, and the entire uterus may be uniformly enlarged, firm in consistency, and somewhat tender to pressure. Exacerbations of pain, tenderness, and a purulent leucorrhoea are suggestive of gonorrhoeal infection.

There is nothing in the macroscopic or microscopic appearance of the tissues of the uterus that will characterize a gonorrhoeal infection. The tissue changes are identical with those of puerperal infection. On the vaginal portion of the cervix are erosions of the papillary, glandular, and follicular varieties. In the cervix and body of the uterus the macroscopic appearances are those of endometritis of the hypertrophic, polypoid, or fungus types, which under the microscope present the usual picture of glandular or interstitial endometritis. It is only by the detection of the gonococcus in the tissues that the diagnosis can be made with certainty.

In the wall of the uterus there is commonly an excess of connective tissue which may be associated with a corresponding atrophy of the muscular elements. The vessel walls may be thickened in the medial and adventitious coats and the lumens of the vessels filled with blood. These are the usual findings of chronic metritis of whatever cause, and a diagnosis of gonorrhoeal origin can only be made by finding the gonococcus in the tissues, but this is by no means easy.

#### **GONORRHOEA OF THE FALLOPIAN TUBES.**

Gonorrhoeal salpingitis follows the involvement of the uterus. The infection has been known to reach the tubes 10 to 14 days after the initial infection of the cervix, but the rule is that the infection remains confined to the uterus months and possibly years before it is conveyed to the tubes. Hence the necessity of giving a guarded prognosis as regards the involvement of the tubes in gonorrhoeal infection of the uterus, no matter how limited the infection may be.

The infection is not infrequently made to extend from the uterus to the tubes by intrauterine manipulations with the sound and curette. This fact should make us cautious in the use of these instruments when the infection is confined to the uterus and has not yet reached the tubes.

Following upon menstruation, and particularly upon childbearing and abortion, the infection is prone to extend to the tubes. Here we have the explanation of many cases of tubal infection arising in the puerperium without an assignable cause. It is said that the invasion of the tubes is always marked by an acute onset of the symptoms. Gonorrhoeal salpingitis is often ushered in by a chill, the temperature rises and pain and tenderness develop in the locality of the tubes. Usually both tubes are involved. The menstrual periods are prolonged and painful. In the acute stage muscular rigidity makes an anesthetic imperative if the tubes are to be located and outlined. Great caution is to be exercised in palpating the tubes in the acute stage for fear of stripping pus from the abdominal end of the tube.

Under narcosis the tube is outlined as an irregular, elongated mass extending from the horn of the uterus directly outward or lying to the side of or behind the uterus. It is seldom freely movable and is more often firmly adherent to the neighboring structures. In the early stage the tube may be but slightly enlarged; in fact, the lesion may escape detection. Throughout the chronic stage exacerbations are frequent, and these are attended by all the subjective and objective signs of an acute infection.

When the tube becomes distended with pus (pyosalpinx) and the infection extends beyond the tube to the ovary and peritoneum, the symptoms are increased in severity and prolonged.

On bimanual examination the infected tubes are found in their normal locality or fallen to the side of the uterus, or back of the uterus. They are increased in size from but little beyond the normal to that of a large grape fruit. The mobility of the tubes is always restricted though no accurate estimate of the extent of the adhesions can be gained by a bimanual examination alone inasmuch as the tubes may be adhered to movable coils of the bowel or to the bladder and permit of a considerable excursion by bimanual manipulations.

When the tube distends with pus or serum it assumes one of

three characteristic shapes; retort, sausage or club shaped. Such a swelling attached to the horn of the uterus that is tender to pressure may be assumed to be an inflammatory tube sac.

Chronic gonorrhoeal salpingitis is almost always bilateral and being such, sterility is all but inevitable. There is more or less tenderness in the location of the tubes. During menstruation tenderness and pain are usually complained of. While not seriously incapacitated, the patient cannot be said to ever be perfectly well.

The uterus always and the ovaries commonly are likewise involved in the infection and contribute their share to the symptom complex. Thus we see the victim of a general gonorrhoeal infection of the pelvic organs, pale, nervous, easily fatigued, without appetite, with dark rings about the eyes and totally lacking in physical vigor. The menstrual periods are painful and irregular both in time of appearance and amount of blood lost; there is a troublesome leucorrhoea, constipation, and more or less difficulty experienced in urinating. From time to time these symptoms are exaggerated together with a rise of temperature.

### **GONORRHOEA OF THE OVARIES.**

Gonorrhoeal ovaritis is an almost constant sequel to tubal infection. There are no distinctive clinical features in ovaritis not found in salpingitis, and it can only be assumed that the ovaries, together with the tubes, are involved. With the involvement of both tubes and ovaries sterility is the almost inevitable result.

All the inflammatory lesions common to the ovary are observed. Adhesions form about the ovary binding it to the tube and surrounding structures. Newly-formed connective tissue may develop in the substance of the ovary and lead to cystic degeneration. In addition to these pathologic conditions, abscesses of the ovary are not infrequently developed in the follicles and corpus luteum.

### **GONORRHOEA OF THE PERITONEUM.**

Contrary to the views previously entertained, the gonococcus may invade the peritoneum and give rise to an inflammatory reaction. It is not essential, however, that the gonococcus be resident in the peritoneum in the presence of an acute or chronic inflammatory lesion of the peritoneum in the neighborhood of a gonorrhoeal metritis, salpingitis and ovaritis.

It may be fairly assumed that the peritoneum is involved in the acute stage of a gonorrhoeal infection when the pelvic pains are sharp and excessive.

It is possible that an acute pelvic peritonitis may resolve itself into a normal state but where the appendages contain pus or where the infection is widespread and persistent adhesions are almost sure to develop. These adhesions are at first frail, but may develop into strong bands which firmly unite the pelvic viscera to surrounding structures.

Accumulations of pus may be found in the meshes of the adhesions with little danger of contaminating the general peritoneal cavity.

The severity of the pain and tenderness in the pelvis, the frequent exacerbations, the discomfort occasioned by the movements of the patient, the tendency to bloating at the menstrual periods are all suggestions of the presence of pelvic peritonitis.

On bimanual examination the restricted movements of the uterus and its appendages, even to complete fixation, together with the unusual degree of pain occasioned by the manipulations of these organs, are highly suggestive of the presence of adhesions. If with these findings the organs are found displaced, the diagnosis is more nearly confirmed. While it may be possible to feel adhesions in a bimanual examination, it must be admitted that adhesions commonly exist and are not infrequently extensive where it is impossible to feel them and where the pelvic organs are little or not at all restricted in their movements. I would venture the assertion that it is never possible in any case to diagnose the absence of adhesions short of direct inspection or palpation through an incision.

General gonorrhoeal peritonitis is exceptionally rare. Bumm states that he has never seen a case. In my personal experience, I have observed but one such case, but in this case my clinical and post mortem diagnosis was not confirmed by a bacteriological examination. Martin, Broese, Veit, Leopold, Penrose, Menge, and Ceppi have all reported cases. The majority of these, like that of my own, were reported from clinical data.

### **GONORRHOEA OF THE ANUS AND RECTUM.**

Gonorrhoeal infection of the anus and rectum are seldom recognized, yet its occurrence is unquestion-

ably more frequent than we are given to suspect. The soiling of the anus with the vaginal discharges, coitus per anum and the conveying of the infection by instruments and fingers account for the frequency of its occurrence. Baer, in 191 cases of gonorrhoea of the genitalia, reports that 67 or 35 per cent were complicated by a rectal and anal infection.

The symptoms referable to the infection of the anus and rectum are a feeling of heat and burning in the rectum after defecation. Where ulcers and fissures form about the anus, the pain is increased and may be excruciating. The secretion may be scant or abundant and is purulent or mucous in character; occasionally it is blood-streaked. The secretion may not be observed without examination through the speculum. Only by a bacteriological examination of the secretion can the nature of the infection be recognized with certainty. In the acute stage, the gonococci are found in abundance; in the chronic stage, they are few in number and may escape recognition.

There is nothing characteristic in the appearance of the inflamed mucosa. In the acute stage, the mucosa is red, swollen and covered with a purulent secretion. In the chronic stage, the mucosa is mottled and fissures and ulcers may be found about the anus. Abscesses may develop around the bowel and these in turn give rise to the formation of fistulae.

According to Mikulicz, cicatricial contraction of the rectum may ensue.

## FREQUENCY OF GONORRHOEA IN WOMEN

Neisser says that of the venereal diseases which come under the notice of medical men, 50-70 per cent are gonorrhoeal, notwithstanding the fact that this disease more often escapes statistical utilization than do syphilis and contagious ulcerations. He further asserts "that the statement that of the adult male population inhabiting large towns only an insignificant proportion escapes gonorrhoeal infection, is not at all exaggerated. And yet it is just this very prevalent disease—the importance of which is underrated more than that of any other—which is scarcely noticed and which is either not treated at all or only improperly or insufficiently. No wonder there is a large number of uncured cases, or in other words, of cases which possess full infectiousness, but which do not constitute a disease in the eyes of the persons affected."

It is observed that gonorrhoea of women abounds with greater frequency in women of the lower classes where moral safeguards fail to a greater degree than in women of higher grades of society. It is admitted that men are infected in greater numbers than women, but not to the degree indicated by statistics. The greater difficulties involved in the diagnosis of gonorrhoea in women and in obtaining reliable statistics account for the discrepancy. In the statistics taken from the hospitals of Prussia, in 1899, we find almost equal division of men and women, showing an almost equal prevalence of gonorrhoea in the two sexes. These statistics, however, are not reliable because more than one-third of the women were prostitutes.

Noeggerath said, in New York, of 1,000 married men, 800 have had gonorrhoea; 90 per cent of all these have not been healed and can infect their wives; that, in New York, of 5 married women, at least 3 have gonorrhoea. Bumm believes these statistics extravagant, and especially those relating to the incurability of the disease in men.

Swarz found in 100 married men who had gonorrhoea that 10 were yet infected, and that 10 others acquired a fresh gonorrhoeal infection after marriage.

Sänger estimates that 18 per cent of his gynecological cases in clinics and private practice had gonorrhoea, and Zweifel from 10-11 per cent in the clinic at Leipzig.

As to the frequency of gonorrhoea complicating pregnancy, Oppenheimer found in the Heidelberg clinic 27 per cent of 108 pregnancies gonorrhoeic; Schwarz, 77 times in 617 cases (12.4 per cent); Lomer, in Schroeder's clinic, 28 per cent (32 pregnancies, 9 gonorrhoeic).

### **FREQUENCY OF STERILITY OF WOMEN DUE TO GONORRHOEA.**

The inhibiting influence of gonorrhoea upon the procreative capacity of women should demand our serious consideration, for to this disease a large portion of sterile marriages may be ascribed. A review of the literature will convince one that gonorrhoeal infection is not necessarily a barrier to conception. Statistics from a number of the continental hospitals show 20 to 25 per cent of pregnant women to be infected with gonorrhoea. Gonorrhoea of the cervix does not prevent pregnancy, and it has repeatedly been shown that endometritis and salpingitis of gonorrhoeal origin do not always preclude the possibility of pregnancy. Brothers reports two cases with bilateral pus tubes, in which the patients subsequently gave birth to several children. A similar case was recently observed by myself. Noeggerath found that 49 out of 81 wives of men known to have had gonorrhoea were absolutely sterile, and 11 were relatively sterile. Glunder found that in 87 sterile marriages, 62, or 71.3 per cent, were chargeable to gonorrhoea. Bumm estimates that 30 per cent of gonorrhoeal patients are sterile.

The so-called "one-child sterility" is accounted for in large measure by the extension of a pre-existing gonorrhoeal infection during the puerperium, for it is a long-established fact that in the puerperium the infection which was confined to the cervix and urethra is prone to extend to the corpus and tubes, and will then almost certainly result in sterility.

Inasmuch as the prognosis is largely influenced by the location of the infection, it will be of the greatest interest to inquire into the frequency of the various local infections. Steinschneider found in 37 cases that the urethra was involved 34 times. In only one case was the vagina infected, and this was in a girl aged 9. The cervical secretions contained the gonococcus in 16 cases. Fabey, in the clinic of Doutralepont, observed 38 cases in which the gonococcus was found in the urethra alone 20 times, in the urethra and cervix 16 times, and in the cervix alone 2 times. Brunseke, of the Wurtzburger clinic, observed 200 cases, of which 90 per cent were of the urethra, 37.5 per cent of the cervix, and 12.5 of the Bartholinian glands. Neisser attributes 45 per cent of sterility in women to gonorrhoea. Zier-Ascher found that 121 of 227 women infected with gonorrhoea were sterile.

Noeggerath, in 81 cases of male gonorrhoea, finds 49 wives (60.5 per cent) absolutely sterile, and 11 (13.6 per cent) relatively sterile. Glunder found in 87 sterile women that gonorrhoea existed in 71.3 per cent. If we accept the statistics that 12 per cent of marriages are sterile, then, according to Noeggerath, 8 per cent of marriages are sterile through gonorrhoea. Bumm does not believe this to be true, and thinks the chief cause of the sterility of women is under-development of the genital organs. Erb found in 2,000 men that 971 had gonorrhoea. In 400 marriages to formerly infected men, 375 (93.75 per cent) remained free of infection in the pelvis of the wife; 12 per cent of the wives were sterile; 68 per cent had two or more children.

Kehrer, in 96 sterile marriages, found the husbands sterile in 40 cases. Courty, Gross, Pajot and others give lower proportions of male sterility.

#### STATISTICS AS TO LOCATION OF INFECTION.

Steinschneider found in Neisser's clinic, in 37 cases, the following: Urethra infected 34 times; gonococci were found in the vagina 36 times, but in only one case was there a vaginitis and that in a maiden 9 years old. The cervix was infected 16 times.

Fabey in Doutralepont's clinic found in 38 cases:

20 in urethra.

16 in urethra and cervix.

2 only in cervix.

Brunseke and Seifert, in the Wurtzburger clinic, found in 200 cases: Urethra, 90 per cent; cervix, 37½ per cent; and Bartholinian gland, 12.5 per cent. The above statistics were found in acute cases. In the chronic stage there is but a small percentage of urethral infection.

The influence of gonorrhoea upon the course and termination of pregnancy is a subject that should engage our serious attention, for while a gonorrhoeal infection frequently does not preclude the possibility of conception, it not seldom happens that the course of pregnancy is interrupted, and that the puerperium presents serious complications which may hazard the life of the patient. Sänger affirms that the abortive influence of gonorrhoea is as pronounced as that of syphilis, and that in a large proportion of gonorrhoeal women abortions are inevitable. Noeggerath found that 19 out of 53 women who became pregnant in the course of a gonorrhoeal infection aborted. Frühinsholz collected a series of 201 pregnancies in the course of gonorrhoeal infection, and of this number 161 women went on to full term, 4 aborted, and in 36 pregnancy was terminated by a premature accouchement.

It is admitted that gonorrhoeal salpingitis predisposes to ectopic pregnancy by distorting the course of the tube and destroying the ciliated epithelium of the endosalpinx. These changes tend to arrest the descent of the ovum through the tube.

One case in seven of puerperal sepsis is caused by gonorrhoea. Of this number few are the result of contamination in labor and the puerperium. The majority is due to pre-existing infections in the genital tract which are awakened to renewed activity and caused to extend; a gonorrhoeal cervicitis extending to the body of the uterus and thence to the appendages; a latent infection in the appendages extending to the peritoneum, and thus it happens that an infection which may have been previously unrecognized becomes a serious menace to life.

The risks to the offspring, while not so serious as in syphilis, are not to be underestimated. In the passage of the child through the maternal parts it undergoes, as Morrow has expressed it, "a veritable baptism of virulence." The conjunctivas become infected and the possibility of blindness is imminent. It is estimated that

from 10 to 30 per cent of the blindness in the world is ascribable to gonorrhoea. According to Neisser there are now in Germany 30,000 blind persons whose loss of sight may be thus accounted for. It is estimated that of the inmates of the asylums for the blind on the continent blindness due to gonorrhoea ranges from 20 per cent to 80 per cent. Happily the frequency of this accident is being materially reduced by antiseptic vaginal douches given prior to the delivery, and by the employment of Crede's method of treatment of the eyes of the newborn.

## SOCIOLOGY

Referring to the murderous effects of gonorrhoea, J. Taber Johnson writes as follows:

"I know of no statistics of the mortality arising from gonorrhoeal infection of the female organs of generation, but we can obtain an approximate idea when we consider the great number of major surgical operations performed on its account, the number of abortions caused by it, and the untold number of conceptions prevented by the disastrous results of such infections.

"There is little doubt in my mind that, at a most conservative estimate, one-half million prostitutes are living in houses of ill-fame in our large cities, and I am not sure a million would not be nearer correct; writers on this subject generally estimate as many women living lives of easy virtue outside as inside of the disreputable houses. In our country alone we have, then, one million and a half, if not twice that number, who have or are liable to have gonorrhea any day, with all the possible consequences referred to.

"It is estimated that from 40,000 to 50,000 prostitutes die annually, and that their places are immediately filled by new recruits. While much of this mortality may be due to the results of dissipation and natural causes, at least 30 per cent of this mortality is due to the direct effects of gonorrhoea.

"It is estimated that 110,000 deaths occur annually from tuberculosis in our country, 107,000 from pneumonia, and 43,000 from typhoid fever. While there are no statistical reports of investigations of the mortality due to the infections and ravages of gonorrhoea on the female generative organs I have little doubt, if it could be ascertained, that the race suicide arising, directly and indirectly, from this disease would equal the mortality of any of the three diseases mentioned, and I am not sure that it would not exceed them all combined, if we take into consideration the depopulation caused by the one-child sterility, and also the absolute sterility pro-

duced by gonorrhoeal inflammation of the uterus and its appendages.

“It is customary to include the death of the child when comparing the maternal mortality of craniotomy with that of Cesarean section. Thus, if 25 per cent or 75 per cent of maternal deaths occurred after craniotomy, the mortality of the operation would be stated as 125 per cent or 175 per cent, as the case might be. So, in speaking of the mortality of the effects of gonorrhoea on the female generative organs, one might on the same principle include that indefinite multitude of children which would have been born but for the inhibitory effects of the gonococcus on the female conceptional capacity.”

When may a man who has, or who has had, gonorrhoea, safely marry? This is a question which frequently confronts the physician. The answer is emphatic and uncompromising that the time for marriage is not until after repeated bacteriologic examinations there is demonstrated an entire absence of gonococci. This pathologic fact must be accepted as the sole basis of the physician’s decision.

It is unusual for a man to marry while in the acute stage of a gonorrhoeal infection, but we are repeatedly confronted with instances of marriage while the husband is as yet uncured from a formerly acquired gonorrhoeal infection. Neisser tells us that the bulk of gonorrhoeal cases are cured, but that a considerable number of cases are not perfectly cured. He also observes that many of these uncured cases marry, and do not infect their wives.

We infer from this that these residual affections which fail to convey infection are not infectious. In other words, virulent gonococci are no longer present, though clinical and anatomical evidences would speak for their presence. We are therefore forced to admit that in so-called “chronic cases” we cannot rely upon clinical and anatomical evidences. Gonococci may be present in the absence of all clinical signs, and in the presence of the most insignificant anatomical changes in the urogenital organs, and on the other hand the most distressing symptoms may be at hand, and all sorts of inflammatory changes may be present in the absence of gonococci. It is one thing to conclude that these conditions are the result of gonorrhoea, and another to say with certainty that the gonococcus

exists in the secretions and in the tissues which are recognized as essentially morbid.

To determine the infectiousness of a given case we have but to recognize the gonococcus. Our present state of knowledge does not permit of discriminating between the gonococcus of low virulence and that of high virulence.

The most malignant of cases may be acquired from long standing and latent cases; hence, we must view all cases in which the gonococcus is found as infectious, without regard to their relative degrees of infectiousness. The positive finding of the gonococcus strictly forbids marriage until treatment has eliminated the presence of the gonococcus. When we find the gonococcus we say marriage is prohibited, but when by repeated bacteriological examinations we fail to find the gonococcus, can we say that it is impossible to transmit an infection? In view of the possibility of a mistake in our observations, we must answer in the negative, but this does not carry with it the implication that the physician is never justified in sanctioning marriage in such an event.

If we make our examinations as searching as possible, and are governed by our results, Neisser asserts that the number of mistakes made, under such precautionary measures, will be practically nil. In this opinion Neisser is supported by Schaffer, Neuberger, Herxheimer, Loewenhardt, Harttung, Jodassohn, and others.

If, in view of the fact that one cannot say with absolute certainty that a case is no longer infectious, the physician should assume the attitude that he will never sanction marriage, he certainly frees himself from the possible responsibility of the spread of the disease, but it is also true that he will unjustly condemn many men to celibacy.

### THE RELATIONS OF GONORRHOEA TO SOCIAL ECONOMY.

The relation of gonorrhoea to the social economy is one worthy of serious consideration, but will not be discussed in detail in these pages.

In this connection we would reflect upon the loss of time and labor, the inability of self-support as the result of gonorrhoeal infections, the shortening of lives, and, not the least, the burden of blindness upon the community. It is said that 20 to 30 per cent of

blindness in this country is due to gonorrhoeal ophthalmia. Millions of dollars are spent annually upon the care of the blind.

“Venereal diseases respect no social position, and recoil before no virtue; they ramify through every class and rank of society. Like *palida mars* they approach with equal step the habitations of the poor and the palaces of the rich. They constitute the connecting link which unites the virtuous wife and the debased harlot in the kinship of a common disease.” (Morrow.)

Morrow further states that “in the case of gonococccic infection, the individual risks the wife is made to incur are much more serious than those following syphilis. The infection may invade the cavity of the uterus and ascend to the annexal organs, causing salpingitis, ovaritis, peritonitis, etc., destroying her conceptional capacity and rendering her irrevocably sterile, to say nothing of the resulting dangers to life and the frequent necessity of surgical operations to remove her tubes and ovaries.”

I might further add, in support of the statement of Morrow, that the risks to the wife are greater in gonorrhoea than in syphilis, that the prospects of cure are better for syphilis.

No disease of the adult population approaches gonorrhoea in its prevalence. According to Morrow, the prevalence of syphilis is estimated at 5 to 18 per cent and gonorrhoea 75 per cent. This percentage does not maintain in the rural districts, but is much greater in the cities.

“So far, we have referred only to the practical evils, but there is another and even sadder phase of the subject; that of the social misery caused by the introduction of the disease into the family circle. Estrangements between husband and wife are thereby engendered, which lead to separation and divorce. Applications for divorce are made on the grounds of non-support, cruelty and desertion; but too often these accusations are but cloaks to hide the shame which cannot be mentioned because of the shame. Add to the feeling of resentment toward the man who has polluted her the consciousness that motherhood is denied her, and the fate of the wife is wretchedness and disappointment.”

“It not infrequently happens that from a religious prejudice against divorce, the desire to save appearances before the world, or the shrinking from notoriety, the husband and wife lead divided

lives, while continuing to dwell under the same roof. In most cases matters arrange themselves. The wife with a charity born of a belief in the universality of masculine unchastity, forgives her husband while accepting her fate as the common lot of women."

"It is not to be assumed that husbands have no share in this marital misery. On the contrary, they may be overcome with remorse upon seeing the sins of their youth visited upon their wives and children. Even when they have not communicated their disease, they may live in constant apprehension lest they should do so; an awakened conscience is a terrible foe to happiness. Oh, what men do, what men dare to do, what men daily do, not knowing what they do!" (Morrow.)

Gonorrhoeal ophthalmia presents one of the most serious phases from a sociological point of view. It is estimated that from 10 to 30 per cent of the blindness of this country is due to gonorrhoeal ophthalmia, while in some other countries, notably France and India, the percentage is much higher.

Not only do the secretions laden with gonococci infect the eyes of the child while passing through the cervix and vagina in labor, but the infecting secretions may be conveyed from the eyes of the mother or nurse after birth.

Not only the eyes of the newborn are liable to infection, but any and all members of the family may be similarly infected.

That coitus is not essential to gonorrhoeal infection is an established fact. Experimental inoculations have proven this, and clinical observations bear abundant proof. Water-closets, towels, fingers, instruments, thermometers, may be the source of a contagion involving one or more members of a family. There are, therefore, innocent victims, and these in the majority of cases are young girls who acquire a vulvo-vaginitis. An overwhelming proportion of the cases of vulvo-vaginitis in young girls is gonorrhoeal in origin and is of innocent origin. Criminal intercourse was formerly believed to be the sole cause of such cases, and unjust accusations were made which led to the punishment of innocent persons. Epidemics of specific vulvo-vaginitis are seen in children's wards and are chargeable to faulty management. It is rare that the disease extends to the uterus and its appendages in infancy, though authentic cases are reported.

Referring to the sociologic aspects of gonorrhoea, Ernest Cushing says:

“In considering the subject of gonorrhoea we realize that it is a factor of the greatest importance in influencing the fortunes and destinies of nations, as well as of individuals, inasmuch as it is essentially a disease of dense populations and of the congestive life of cities, thence spread broadcast by the influence of civilization and commerce, and acting wholesale as a check on reproduction. Although its full importance has become apparent only within the last few years, yet we cannot doubt that for ages this disease has acted in the same way, and if time permitted I could trace the connection of this influence with the historic facts known as to the degeneration and disappearance of the conquering races when subjected to the influences of older and more corrupt civilizations, as well as to the decline and fall of successive empires and peoples.

“This disease, then, is to be considered as a blight or parasite following civilized man as other pests prey on the cultivated crops and domestic animals; in a large way, it may be said to limit the reproduction of those individuals, families, and societies which cannot or will not confine their sexual activity to the limits imposed by the conditions of civilization.”

## TREATMENT

More progress has been made in the etiology, pathology, and diagnosis of gonorrhoea than in the treatment. We must admit that the treatment of the disease is far from satisfactory.

### PROPHYLAXIS.

It is in the exercise of known preventative measures that the greatest good is effected; hence the following discussion of the means of prevention.

Since the cure of gonorrhoea is so unsatisfactory, and when deeply seated is usually only accomplished by a mutilating operation which too often unsexes the woman, prophylaxis becomes the paramount issue in the management of gonorrhoea of women.

The prevailing impression among men that gonorrhoea is a trifling disease, a mere incident in their experiences which is no more serious than the "catching of a cold," is responsible for not a little of the spread of the disease. Much good would be accomplished if the public could be made to appreciate the serious consequences of the disease. It should be impressed upon men in general that once they become infected they are sexually incapacitated until pronounced cured by an expert; that long after the active stage of the disease has passed, and the gleety discharge has disappeared, they may transmit a virulent infection.

But, unfortunately, it is not alone the laity which is in need of education in this respect; the profession is often guilty of being too hasty in pronouncing a cure and in giving sanction to marriage and to the resumption of the marital relation. Untimely interference with uterine and urethral applications in the early stage of the disease too often causes an extension of the infection and makes a serious lesion of what might otherwise have been a self-limiting disease.

It is, in fact, questionable if the average practitioner is competent to pronounce a patient absolutely cured, inasmuch as the final test must be the exclusion of the gonococcus in repeated examinations.

Our office is, then, to instruct and enlighten the community so that a public opinion may be formed, which is the only reliable foundation for the enforcement of laws. Meanwhile, it is the duty of our profession to instruct itself and then to enlighten the community as to the importance and gravity of the disease.

From Cushing we quote:

“When, however, we come to consider the subject of the regulation of prostitution, which is usually attempted when its total suppression is found impossible, we find that it is not only a question of police, but also very largely one involving the medical profession, since both in diagnosis and treatment the police must depend on medical assistance. In the first place, the attempt to suppress and extinguish the disease would be entirely futile since the diagnosis is too difficult, the duration is a latent form too long, and the fact of cure too uncertain. Moreover, a very large proportion of cases of gonorrhoea are acquired not from prostitutes by trade, for they are instructed in their business, live under some discipline in brothels, and keep themselves clean, avoiding infection by knowledge and being driven out when known to be diseased; but the most dangerous women are precisely those who are not prostitutes by trade, but who are unchaste enough to submit to opportunities of infection, ignorant enough not to know their danger or avoid it, shamefaced enough to conceal their disease, and so keep spreading the malady.

“Medical regulation and supervision of prostitution are therefore inadvisable, inadequate, and promotive of a false sense of security from infection.”

The question arises as to what shall be the attitude of the physician where marriage cannot be prevented. Shall he wash his hands of the whole matter, and decline to give advice as to the possible means of preventing the transmission to the wife of an infection which exists in the husband? This is the attitude of many, but I cannot agree with them, for it is the duty of the physician to vigorously defend the wife, to the bitter end.

Much as it might be desired, it is not the privilege to disclose the professional secret to the fiancé, or to her parents, to prevent the consummation of the marriage vows, in the face of a threatened disaster to the health, happiness and life of the wife. He must use

the knowledge in his possession to safeguard the wife, so far as in his power, against possible contamination, since he cannot prevent the marriage.

The means at his command are all uncertain of results, yet they are to be recommended. He may advise abstinence from intercourse until the disease in the husband has been cured. This advice is rarely, if ever, followed.

He may inform the husband of the earliest symptoms indicating the onset of the disease in the wife, and instruct him to consult him at the earliest possible moment, for the purpose of instituting abortive treatment.

### ABORTIVE TREATMENT.

All abortive measures commonly fail, and I especially refer to antiseptic vaginal douches, together with injections of silver nitrate (20 to 25 grains to the ounce). To be effective the remedy must be applied vigorously and intelligently before the gonococci have passed beyond the cervix or entered the deeper layers of epithelium.

We may advise certain safeguards in intercourse, such as urinating immediately before intercourse; this together with urinating after intercourse. Finally the wearing of a condom may be advised.

H. I. Bolt, of New York City, in writing on The Treatment of Gonorrhoea in Women, (J. A. M. A., Feb. 1, 1908), says:

“It is evident, from the quotations made, how widely the treatment of gonorrhoea varies and how futile it would be to look among the therapeutic measures at our command for any specific that could be depended on to abort an attack.

In the treatment of gonorrhoea in women it is essential to bear in mind that in the great majority of acute cases the disease is limited to the lower part of the urogenital tract, and that if we can bring the patients at once under proper care, we can generally hold the disease in check so that the upper parts of the genital tract will not be infected.”

Frederic Bierhoff of New York has recently written on the abortive treatment of gonorrhoea (N. Y. Med. J., Jan. 11, 1908). The following is an extract from his paper:

“In order to be able to abort a gonorrhoea in a female, the disease must be recognized in its very earliest stages, and before

any structure other than the urethra itself, or the urethra and vulva, or vagina, has become involved. In the early recognition of this disease we find our greatest difficulty to the successful accomplishment of an abortive treatment, for women very rarely present themselves to the physician for examination to determine the presence of gonorrhoea.

“Were physicians to rely solely upon the outcome of a microscopical examination of the scrapings from the urethral and cervical canal, they would find that a fair proportion of supposedly healthy women are, in reality, afflicted with gonorrhoea in a subacute or chronic form. Since I have based my diagnosis solely upon the microscopic findings in the case of females, I have been surprised to find how many of them there will be found who, in the absence of any inflammatory reaction about the urethral orifice, or in the absence of any visible discharge whatever, are still found to be infected with gonorrhoea, as shown by the presence of typical gonococci in the urethral and cervical scrapings. Were the initial stage of a gonorrhoea in a female accompanied by more severe symptoms—that is, more pronounced distress upon urination, as is the case in the male, so that the women were led to consult a physician early in the disease—and were physicians to rely for their diagnosis solely upon the findings under the microscope, I feel sure that a large percentage of the women examined would be found to be suffering with gonorrhoea, and an abortive treatment might be possible in a larger proportion of the cases found infected. Unfortunately, however, in almost all of the cases of gonorrhoea in females, the patient presents herself at a time when the process has already secured a deeper foothold in the urethra, or when the urethral crypts, or the cervix uteri, have become infected. Then, of course, an abortive cure is impossible.

“Frequently, too, it is difficult to decide whether the urethritis is in the early stage of an acute infection, or whether it is of a chronic character. In the decision of this point, I have found the following facts to be of great value to me. In acute urethritis the condition will be found such as Bumm has so beautifully described in his report upon gonorrhoea in the female, as a result of his inoculations with pure cultures of the gonococcus: ‘After the inoculations a serous, transparent, yellowish secretion appears, which contains but

few pus cells, but myriads of epithelial cells. In these, and between them, the gonococci lie in large numbers, in colonies, and solitary examples.' Similarly, in the female as in the male, Bumm's experiments have shown that these clinical signs occur about the third day after inoculation. Later on, during the first weeks, the proportion of pus corpuscles increases.

"It will be seen from these observations that, in order to effect a cure by the abortive treatment, it is an absolute necessity to make the diagnosis early, and that, in order to do this, one must possess the requisite degree of bacteriological knowledge to determine the exact character of the condition to be treated. I have found that, in making the microscopic examination, the ordinary watery solution of methylene blue, or the alkaline methylene blue, is fully sufficient to enable us to make a clinical diagnosis, where the question is one of distinction between the gonococci and other diplococci; but in the chronic stages it may become necessary to resort to the Gram distinctive stain, and where the question becomes one of medicolegal importance, the culture experiment must be resorted to.

"The condition, *sine qua non*, then, of the abortive treatment of gonorrhœa in the female is, just as in the male, the microscopic examination. If, now, the patient presents herself at an early stage of the disease, and if it be found upon examination that the gonorrhœal infection has not extended to the Bartholinian glands, or to the cervix uteri, then the attempt to employ the abortive method is justified, for, if we do not achieve an abortive result, we do not injure the patient, nor do we do anything that would favor the spread of the infection. Where the Bartholinian glands or the cervix uteri are involved, an abortive treatment is impossible.

"The procedures which I have employed with success are as follows:

"I. A microscopic examination of the urethral secretion, or scraping, and of the secretion showing at the vulvar orifice.

"II. Cleansing of the meatus, and irrigations of the urethra and surroundings with a solution of one-quarter to one-half per cent solution of protargol. Either the hand syringe or the irrigator may be employed, but no great degree of pressure should be employed. In all about 150 c.c. are used for the urethra and surroundings, after which about 150 c.c. of the fluid are injected, through the urethra,

into the bladder, to be later expelled by the patient. In this latter irrigation, the patient is instructed to relax the muscles, as though about to urinate, when the urethra feels distended, whereupon the fluid will be found to flow easily into the bladder.

“III. Cleansing of the vulva with 150 c.c. of the solution.

“IV. A vaginal scraping is now made and examined, the sterilized platinum loop being passed well into the vagina for this purpose.

“V. The nozzle of the syringe is gently inserted into the vagina, the stream of the solution, during this time, passing into the vagina, and the nozzle inserted up to the point where the body of the syringe blocks the outlet. The syringe blocking the outlet to prevent the escape of the injected fluid, the injection is continued until the vagina becomes distended with this solution, which is then allowed to flow out. About 300 c.c. of the solution are used for this vaginal cleansing.

“VI. A sterilized speculum is inserted into the vagina—preferably of the duckbill type—and the vagina, particularly the fornices and the cervical orifice, cleansed by gently wiping with little cotton pledges.

“VII. A specimen of the cervical secretion, or a scraping from the cervical canal, is now made with the sterilized loop, and a microscopical examination thereof made. Should this be found to be free of gonococci, and to contain few or no pus corpuscles whatever, then the vagina is lightly tamponed with several yards of narrow, absorbent gauze strips, saturated in one per cent protargol solution, and the speculum withdrawn. I employ the tamponade whether the vagina be infected or not. If it be infected, I employ a five per cent solution. There is then an exfoliation of the superficial epithelial layers, and usually, in from twenty-four to forty-eight hours, the vaginal secretion will be found to be sterile. If the vagina be not infected, its infection is prevented by this tamponade.

“VIII. A soluble urethral bougie of five per cent protargol in cacao butter, made of a length of an inch and a half, is inserted into the urethra and left therein.

“IX. While the index finger of the left hand maintains the urethral bougie in place by pressure of the finger against the meatus, a pad of absorbent cotton saturated with one per cent protargol

solution, is placed over the urethral and vulvar orifices and kept in place with a 'T' binder. As the patient has urinated in emptying the bladder of the fluid injected into it, she is now instructed to resist the desire to urinate, if possible, for several hours, so that the drug in the melting bougie may be kept in contact with the urethral mucous membrane for as long a period as possible. The pad covering the vulva is also kept moist with the one per cent protargol solution.

"X. Rest in bed, if possible, is of advantage in the treatment. Bland diet should be ordered; all intoxicating or carbonated drinks avoided, and all highly spiced articles of food omitted from the dietary. A daily warm sitz bath, in the evening, completes the treatment. The tampon is left in place for twenty-four hours, whereupon it is removed by the physician, and the treatment, as outlined, repeated. Should the patient desire to urinate, the moist pad is simply removed, to be replaced at once. Under this treatment, within twenty-four to forty-eight hours, if the cure is to prove a success, the urethral secretion must be free of gonococci, as must also the vulvar and vaginal scrapings. After two such applications, if there be no more gonococci present, it is my custom to begin the tests by omitting entirely the urethral irrigation and bougie, and by substituting a vaginal irrigation of bichloride of mercury solution, 1 in 4,000, or a solution of one-half per cent zinc sulphocarbolate for the irrigation with protargol, and the vaginal tampon is entirely omitted. The warm sitz baths are, however, continued for a few days longer. Should the test of the interruption of treatment be followed by no return of gonococcus bearing secretion, then we proceed to the alcohol test. Further control examinations must be made at intervals, and only when the urethral and cervical scrapings continue free of gonococci, even after the next following menstruation, may we discharge the patient as definitely cured. Should discharge with gonococci reappear during the tests, then we simply continue with the treatment until the patient is cured."

Julian says: "It is common to hear women who constantly suffer from uterine torture employ such words as these: 'When I was a girl I was quite well. It is only since my marriage that I have become ill.'

"And every day this confidence, this plaintive refrain saddens

the gynecologist. It is continual and inexorable. From the discolored and suffering faces we may guess a whole past of debility, and the origin is always marriage.

“The husbands have a quiet conscience. They go about their business or to the clubs, create fresh pleasures or new relations for themselves, and desert the mournful marriage bed. They can reckon on sympathy, for who does not pity them for having married wives with such bad health? We cannot fail to be struck when our patients make such remarks as the following: ‘I was married eight years after my first infection, and believed myself perfectly cured, when two months later, I suffered from a slight running.’ ‘Was your wife ill?’ ‘Oh, no, she never knew anything about it, thank God! But now, alas, Doctor, I lost her! She died of puerperal fever after her first accouchement, the year that we were married.’ ”

Grandin writes: “I have endeavored to show that man is responsible for sterility in woman in fully 50 per cent of instances. Could a nobler work be performed by us than to start a crusade—and not, as in the past, a silent one, against these diseases which are responsible for ‘race suicide,’ in its true sense, through the inculcation of knowledge in the minds of parents and the laity, as a body, in reference to the necessity of instruction of the young man as to the risks he runs personally, should he acquire them, and as to the risk he subjects the woman he marries should he carry them to the nuptial couch? Should we, through our moral influence along these lines—and the only possible lines, be enabled to exterminate the gonococcus, preventive medicine would make the greatest of all strides, and yet we, the operative gynecologists, would be deprived of nearly 60 per cent of our work! Woman, however, would be the gainer, the human race be immeasurably increased, ‘race suicide,’ as an opprobrium, would cease to be spoken of, and the unselfishness of the true medical man would again stand strongly in the foreground.

“From the present standpoint, man is not the ‘lord of creation,’ but the ‘exterminator of the species.’ Kill the gonococcus by teaching man the danger to woman and to the species should she acquire it, and then man returns to the condition he is pictured as having been in before Eve tempted him with the apple and he weakly said to his Maker: ‘It is the woman’s fault.’ The average Eve is ready

to procreate; the average Adam is unable—chiefly because of disease acquired in ignorance of its foul sequelæ.

“As I have reiterated above, according to my light, the solution of our problem lies in education. Prostitution—the social evil, is responsible to the greatest extent for the dissemination of gonorrhœa and of syphilis. In the toleration of this evil by society too much stress has been laid upon woman’s part in dissemination and too little on man’s. As has been customary with the latter from the beginning of the world, he points the finger of scorn at woman, he abets woman in the making of the prostitute the social outcast, and yet, were it not for the solicitations of the man, for his untrammeled licentiousness there would be few prostitutes. It is time that there should cease to be recognized a different code of morals for man and for woman. That which is wrong in woman is equally wrong in man, and in face of the diseases under consideration the man is the chief offender and the finger of scorn should be first aimed at him. The starting point in the crusade should be the inculcation of this fact into the minds of the laity, and for this we need a new and a radical system of education.

“Segregation of the female prostitute, licensing, these and other measures have been tried and without avail, because, much as we segregate her, the male prostitute is in nowise restrained and exercises his prerogative of making new female prostitutes. The sexual instinct is a God-given instinct, its purpose being the perpetuation of the species. Man, largely through ignorance of the calamities following the misuse of this instinct, has converted it into one of extermination of the species. Ignorance being at the bottom of his folly, it follows that man, at the age when his instinct is established, should be educated in reference to its purpose and also in regard to the consequences if the instinct be misused. In how many families, not excepting that of the physician, is the pubescent youth instructed by his father or by his teacher in regard to sexual matters, which not alone concern him deeply but chiefly the woman—pure in every sense until he defiles her? The crusade of extermination, therefore, of these ‘race suicide’ diseases, should begin in the family, and where more fitting place than in the family of the physician, the man who above all should be an exemplar in the matter under consideration? I take it that the average young man approaching

puberty is not foul at heart. He has the making of the libertine in him, however, if he be turned loose to graze without the halter. Bridle him well through education in matters sexual, and I believe that at least one-half of the present percentage of these foul diseases will disappear. There remains the born libertine! the man who will not be educated! the type of man who glories in his conquests and boasts of the number of times he has had the clap! This man will continue to make prostitutes, this man will continue to befoul woman, and for him repression is the remedy. The laity is being educated in reference to the methods for the prevention of the dissemination of tuberculosis, educate similarly the laity in respect to these social diseases. In time there will arise in the land a loud cry calling for the suppression of the professional libertine, if need be by laying the strong hand of the law upon him. If you cannot appeal to the reason of such an animal, you can always appeal to his fear. These views may appear Utopian and I grant that to attain them calls for the shaking off of many a shackle handed down from ages. More difficult victories have been won, however, firmer bonds have been broken, and all other means having been tested and having failed after a most lamentable fashion, legislation must finally be invoked to check 'race suicide' as we, the gynecologists, view it. Yet another phase, and this is the education of the young girl. We teach our daughters at the marriageable age the risk they run should they mate with the drunkard; we endow them with all the knowledge and the graces which enable them to shine in whatever social sphere they may be called upon to enter, yet, we tell them nothing about their sexual life and do not warn them against marriage with the libertine. Why should we educate the boy and not the girl? It is on her shoulders that shall lie heaviest the burden of infection. It is she who will weep for the children she lacks because of the foulness of man. It is her inherent right, therefore, to be educated in matters sexual, that she may avoid the rocks which otherwise her health and her life will strand upon. Nowadays, when the old-fashioned family doctor, the friend and the counselor of the family from birth to old age, has been eliminated, the gynecologist, in matters sexual, must take his place, and here within your grasp lies another victory to be won, another jewel to be placed in gynecology's crown. Of necessity you are brought the closest to the

woman, and it is your right and your duty by dropping an advisory seed here and another there to open her eyes to facts which otherwise she may not learn. The sexual hygiene of woman extends even to the nuptial couch and we may properly tell the girl through her mother, or directly, that the man she is about to mate with should be required to submit a clean bill of health, lest all the voyage of her life be bound in shallows and in miseries. But this infringes upon the so-called professional secret, and here is another shackle to be broken. Let the laity look upon these diseases in their true light—as scourges to the race, fouler far than smallpox, than yellow fever, than diphtheria, and the laity will promptly place them in the same rank and be ready to join us in stamping them from off the earth, and the code of secrecy shall no more apply to the one than to the other.”

Egbert H. Grandin, in writing on THE SAFEGUARDING OF MARRIAGE, FROM THE VENEREAL DISEASES, Month. Cyc. of Pract. Med., Vol. X, page 306, 1907, has the following to say:

“Until the so-called medical secret is relegated to the ashheap of other superstitions, marriage cannot be safeguarded against the venereal diseases. This secret was born to protect the guilty at the expense of the innocent. Therefore, too, it makes of the physician an accomplice. Let us see how it works. Examples fortify facts. A young man, about to enter the state of matrimony, consults me because he has acquired the clap or the pox. I warn him against marriage until cured. I tell him of the dangers to health, to life to which he, in all probability, will otherwise subject his wife. Possibly my interests are the keener because I have reared this girl from birth. He declines my advice. The medical secret bars me from telling the parents or the girl herself. I morally condone a crime. The pure girl, in loving faith, must link her destiny with the impure.

“A married man comes to me with the infectious lesion of pox. I warn him conscientiously of the danger he is to his wife and others. He may not heed me. Usually he is too much of a moral coward to tell his wife. Because of the medical secret I cannot. The trusting wife must be inoculated by the ‘fond’ husband!

“A few days after birth a child develops ophthalmia and loses its sight. I may tell the father why, but I cannot tell the mother or

the nurse, because the guilty knows that I am hidebound by the medical secret. The sin of the father is visited on the innocent child!

“Is it a wonder that many medical men wish to be released from this medical secret, the gist of which the Hippocratic oath states to be ‘my tongue shall be silent as to the secrets which are confided to me?’ Although, thereby to repeat, the physician is made particeps criminis, he remains such, or becomes recreant to one of his highest prerogatives. The laity, until educated as to the venereal diseases, will not make him break this secret. It is too essential, I am ashamed to say, to the exercise of the carnal side of too many men. The physician must be compelled to break his secret by legal enactment. It is mandatory on him to break it with respect to—let us say whooping-cough—a disease not to be counted as a drop to the ocean when weighed in the balance against the ills man, woman and unborn child are heir to because of the venereal diseases. I need not burden you with statistical data in proof—this I have repeatedly done elsewhere and at other times. It is a good sign that the laity, through the efforts of this and other societies, is beginning to appreciate the weight of such data. As parents learn, as young men and young women learn something definite about the venereal diseases, public opinion will demand that the physician be freed from this antiquated shackle, and the boards of health—whole powers are well-nigh infinite in face of infectious diseases—will make it mandatory on us to report diseases which Morrow has aptly said do not exist ‘officially.’ I have read somewhere the statement that it is impossible for health boards to trace the venereal diseases. The same statement to the same extent held true as regards all other infectious diseases, and in recent years to tuberculosis. The fallacy of the statement is apparent, since we know what today boards of health are doing in respect to all officially recognized infectious diseases. A beginning must, sooner or later, be made with the venereal diseases; and even though it took a century to reduce their prevalence to a degree, the game is worth the candle for the sake of the innocent. Certainly, no good can come from a policy of inaction.

“Were it known that the medical secret had ceased to exist as related to these diseases, unquestionably at once many would be deterred from acquiring them, in any event from propagating them. It may be said that one effect of legislation would be the driving of

the subject to the quack or the prescribing druggist. I would remind you that in this city, at any rate, an incessant and vigilant crusade under other laws is being made against these offenders and is driving them to cover. If we can only enter the wedge along the line I advocate, diseases which have thriven for years because of the seal of secrecy will wither under the lime-light of publicity. Not at once, but ultimately, and in the future woman, in particular, will rise up and call him blessed who, armed with the courage born of conviction, drives this radical wedge home from the office of Health Commissioner. It requires courage of the highest type from the man who does this, but in the world's history a just cause has never failed in securing a leader. Not alone must he fight popular opinion, but opposition exerted from the ranks of the medical profession, so deeply engrafted is this medical secret. But failing other means of mitigating the ravages of the venereal diseases, the Moses will appear perhaps sooner than any of us here expect.

"I am told by a veterinarian that in the brute creation the diseased male refrains from contact with his mate. It would thus seem that the highest grade of animal shows the least conscience in matters sexual. And so it is that the views which I hold are minority views, and so I am held as dealing in hyperbole and may by chance be deemed a mere idealist. But the facts I hold—at the disposal of any one—are so cogent, the evidence I can produce is so free from the latest medical term—'brainstorm'—that could I find a Commissioner of Health with the requisite moral courage and mental equipment, I believe that 'a little child' might lead him towards the goal which many men may not hanker for, but which must be reached, and will be reached, in order that the innocent may obtain protection. And so, firm in my belief and true to my convictions, I enter this plea for the safeguarding of the marriage bed, assured that, in time, here as ever truth shall prevail and error shall be conquered."

### ACTIVE TREATMENT.

In the management of gonorrhoeal infection in women there must be a keen appreciation of the possible dangers involved in medical and surgical interference, particularly in the acute stage. Unquestionably untimely interference is responsible for the exten-

sion of the infection. Therefore, in discussing the treatment of gonorrhoeal infection, it is of paramount importance to distinguish between the acute and chronic stages.

### TREATMENT OF THE ACUTE STAGE.

In the acute stage of the infection rest is the first principle in the management of the case. All instrumental and digital interference should be dispensed with as far as possible. Digital examinations and the introduction of instruments into the vagina have repeatedly been known to convey a urethral infection to the cervix, and intrauterine manipulations to cause a cervical infection to extend to the body of the uterus, and possibly into the tubes. Furthermore, an infection which has passed to the tubes, but not beyond them, may be caused to spread to the peritoneal cavity by undue manipulation. Realizing these possible dangers, it is incumbent upon the medical attendant to avoid all measures which will disturb the infection when in the acute stage. Rest is then the first consideration in the management of an acute infection. The patient should be confined to her bed until the acute manifestations have subsided.

Second in importance to rest is cleanliness. The urethra and bladder are most efficiently cleansed by increasing the amount of urine. This is best done by drinking large quantities of water and milk. It is questionable if in this stage any remedy taken internally will exercise any considerable antiseptic influence upon the infected mucous membranes of the urinary tract. Urotropin in .45 gm. to .65 gm. (7 gr. to 10 gr.) doses three or four times a day, is reputed to have such an antiseptic action, but doubtless its beneficial effects are overestimated. The list of drugs recommended for the treatment of acute gonorrhoeal urethritis and cystitis is long, but in my judgment they can all be dispensed with. Urethral and bladder injections of antiseptic and astringent solutions are productive of great harm in the acute stage, and should be proscribed. The vagina is to be kept free from leucorrhæal discharges by the employment of vaginal antiseptic douches. Lysol, in 1% to 2% solution, mercuric chlorid, 1 to 2,000, are in common usage. In this way the vaginal and vulvar surfaces are best protected from infection conveyed in the leucorrhæal discharges from the uterus.

The diet should be free from stimulants and spices. The bowels should be kept open by the administration of cathartics. Where enemata are required the greatest caution must be exercised in preventing the conveyance of the infectious vaginal discharges from the vulva to the rectum. To this end the douche point used in the vaginal douches should never be used for injections into the rectum.

For relief from pain opiates, bromides and hyoscyamus may be administered. The following prescriptions are recommended by Kelly:

R Potassii acetatis	5i
Tr. hyoscyami	5i
Aqua	5iii

Sig. One teaspoonful in a third of a tumbler of water every three hours.

R Copaibae	5iv
Spts. eth. nitrosi	5vi
Syr. simp.	5ii

Sig. One teaspoonful in a wine glass of water every two hours.

Sitz baths, hot vaginal douches and hot applications to the hypogastrium in the form of hot water bags and fomentations are of service in relieving pain.

The virtue of the vaginal douche does not rest solely in its cleansing properties. When the infection has spread to the upper genital tract the acute stage can often be aborted, and the distress relieved, by douching with liberal quantities of sterile water, or a mild antiseptic solution. In order that the best results should be obtained the patient should be in the recumbent position, and the douches should be continued for a period of twenty minutes at as high a temperature as is comfortable to the patient. These douches should be repeated every four to six hours.

Under no circumstances is the uterine cavity or the cervical canal to be invaded in the acute stage with injections or with swabs for fear of extending the infection.

Surgery, then, has no place in the treatment of acute gonorrhoeal infection, with the possible exception of those rare cases in which an acute inflammatory exudate accumulates in the pelvis, which can be readily drained through the vagina without undue manipulation.

**TREATMENT OF THE SUB-ACUTE AND CHRONIC STAGES.**

When the acute stage has subsided into a subacute or chronic condition more active local treatment may be resorted to. The time when this stage will be reached varies with the virulence of the infection, with the extent of the involved tissues, and with the conduct of the patient and attending physician during the acute stage of the disease. The time limits of the acute stage may be arbitrarily placed at from four to six weeks.

The treatment of gonorrhoea in the sub-acute and chronic stages is largely local, and therefore a topographic discussion of the treatment will be found most practical.

**URETHRA**—Where spontaneous healing of the urethra is not effected, local astringent and antiseptic injections are recommended. Silver nitrate, 1 to 2,000; protargol, 1 to 500; ichthylol, 1-5 to 1-10; these with many other solutions have been used with varying degrees of success. That no one remedy has proved eminently satisfactory is evident from the large number of remedies advised, and the hopelessly divergent views of experts as to their proper application. In the chronic stage of gonorrhoeal urethritis it must be remembered that the lesions are commonly localized in one or more areas, and are best treated with strong astringents and antiseptics, or by the cautery, through an endoscope. For this purpose a 20% to 50% silver nitrate solution may be employed to good advantage, the applications being made with an applicator.

Kelly advises the introduction of an endoscope to but not beyond the sphincter and as it is slowly withdrawn the mucosa which folds into view is swabbed with a five per cent silver nitrate solution. To lessen the pain the urethra may be first swabbed with a ten per cent solution of the hydrochlorate of cocaine. This may be done through an endoscope in the manner described above.

Special attention is to be given the orifices of Skene's glands which are exposed by bent hair pins held by forceps as suggested by Kelly. Through a large hypodermic needle a ten per cent silver nitrate solution is injected into the lumen of the gland. In obstinate cases Kelly advises the opening of the glands throughout (one-half inch) by passing a fine probe into the gland and cutting down upon it. The exposed gland is then cauterized with a ten per cent

silver nitrate solution. The glands of Bartholin are treated in a similar manner.

**VULVA AND VAGINA.**—The method in general practice consists in injecting 10% to 20% solution of silver nitrate into the vagina. In infants this is best done by means of a catheter, and in adults by a cylindric glass speculum. When ulcerations develop in the vaginal surface the cautery may be used to advantage, and to prevent cicatrization of the vaginal walls the vagina may be packed with iodoform gauze.

While nitrate of silver is unquestionably the most effective agency it may be very distressing. A good substitute though not so effective, is protargol in a 10% to 20% solution. One or more daily vaginal douches of formalin 1-2000 may be effectively applied.

In stubborn cases iodoform powder may be applied two or three times a week by dusting the powder thickly upon non-absorbent cotton and tightly packing the vagina. These packs are removed in 24 to 36 hours and are followed by a formalin douche.

#### **TREATMENT OF GONORRHOEAL VULVO VAGINITIS IN INFANTS AND YOUNG GIRLS.**

Here prophylaxis is of the highest importance. Mothers, the victims of a gonorrhoeal infection, are to be instructed in the danger of carrying the infection to the child while attending to its toilet. It is of especial importance to warn her against the use of any towels and diapers that may have been contaminated by the leucorrhæal discharges of the mother; to avoid the uses of syringes in common and to look to her hands that they be not contaminated when attending to the child. No nurse known to have gonorrhœa should be permitted to care for a child.

When the infection arises in the child the mother must be informed of its infectious nature and of the necessary precautions to be taken to prevent further contagion. All clothes should be burned or disinfected, syringes must be sterilized before and after using and the hands of the nurse must be sterilized after attending to the toilet of the child.

The treatment is local, little if any good has been accomplished by general medication.

The child is placed in the dorsal position with the thighs flexed upon the abdomen. The labia are held apart with the thumb and index finger of one hand while the inflamed surface of the vulva is carefully sponged with an antiseptic solution. Permanganate of potassium, 1-2000, lysol or or creolin 1-200, and bichloride of mercury 1-2000 are employed for the purpose. The vagina should be irrigated through a rubber catheter attached to a syringe with similar solutions. Over the vulva may be placed a sterile gauze pad or one saturated with the following solution:

Formalin	-----	1 part.
Glycerine	-----	20 parts.
Aquae pura	-----	79 parts.

In obstinate and long-standing cases vaginal injections of silver nitrate 1-500 or protargol 1-20 may be made two or three times a week. If the urethra is involved injections of protargol 5 to 10 per cent may be employed.

**Uterus.**—When the acute stage has subsided into the sub-acute and the active congestion has lessened, the danger of spreading the infection by various diagnostic and therapeutic manipulations, while not so great as before, is still possible, hence the greatest caution and reserve should be exercised. In the chronic stage, however, the danger is slight, and local treatment is not only admissible but advisable and even imperative. In the course of the treatment bacteriologic examinations are to be made from time to time to note the progress of the treatment. By so doing we are not dependent upon the deceptive and altogether unreliable clinical signs. The patient is pronounced free of infection only when repeated bacteriologic tests give negative results. Local treatments are never so successful when there is general malnutrition and anemia, hence the importance of supportive treatment in such cases. It is essential first to determine the extent of the infection, whether it is confined to the cervix or has spread to the body of the uterus. It is manifestly impossible to do this with absolute certainty without an exploratory curettement. However, when the leucorrhœal discharge is scant and tenacious, it may fairly be assumed that the cervix alone is involved; and in such cases the applications are made only to the cervix.

In nulliparas it may be necessary to incise the external os in order to make frequent and thorough applications.

The secretions which adhere tenaciously to the cervical mucous membrane are first wiped away with swabs of sterile cotton, and then astringents and antiseptics are applied. A 1% to 5% silver nitrate solution may be so applied two or more times a week, or the cervix may be packed with a gauze strip saturated with 5% to 10% ichthyl in glycerine. In my judgment the most efficient remedy is 10% to 40% formalin introduced on a swab.

To erosions of the cervix a stronger application of silver salt may be applied. I would here recommend a 10 to 20 per cent solution. This may be applied with swabs one or more times a week. Where the cervix is deeply infected the most effective means to be employed is the amputation of the cervical lips.

When the endometrium of the body of the uterus is involved, the procedure in general practice is to curette the entire endometrium and follow with an antiseptic swab. My preference is for pure formalin.

Injections into the uterine cavity of mild antiseptics and astringents have been recommended and extensively used, but the results are at best uncertain and the method not to be advised.

Boldt writes: "The advantage of a perfectly-made intrauterine applicator syringe over all other methods for applying intrauterine medication through a cervical canal that has not previously been dilated by mechanical means, can not be overestimated. The tip should be four and one-half inches long and slightly curved near its terminal end. It should be absolutely smooth and even in its entire length and have only one opening at the terminus. It should be made perfectly tight at its proximal end so that no fluid can escape it while the medicament is being ejected into the cotton. The medicament comes into direct contact with the parts for which it is intended, because the cotton is soaked first at its very end and is gradually saturated with the medicament from above downward. If, on the other hand, the medicament is applied by means of one of the various applicators that are on the market, the active value is lost to a greater or less extent in its passage through the cervical canal. This holds good especially with nitrate of silver solution, which becomes coated with albuminoids before the applicator reaches the fundus. Besides, if it is intended to use a medicament possessing irritating qualities, as, for instance, tincture of iodin, the passage of a

medicated applicator is more or less impeded through a cervical canal of ordinary diameter. It took a long time for me to get the instrument perfected in all its requirements. The ready leaving of the intrauterine tampon *in situ*, if this is desired, is facilitated by slightly anointing the tip with vaselin.

While the treatment by copious intrauterine irrigation with weak antibacterial solutions gives fairly satisfactory results, as is evidenced by the number of its adherents, yet in my hands it has not been so satisfactory as the before-mentioned methods, especially that with curetting. Furthermore, with the latter method the danger of the irrigating fluid entering the peritoneal cavity is obviated, if the treatment is properly carried out and the pressure is not too great."

When the appendages are involved, and it is not determined to remove them, curetment will be found not only unsatisfactory in its results, because of the almost certain return of the symptoms, but because of the liability of awakening the tubal infection and causing it to extend. A safe rule to follow is that in the presence of infected appendages curetment should not be done except for the control of hemorrhage, and then only with the greatest caution. Curettage may fail to rid the uterus of infection and repeated curetments may fail. Then it is that the gonococci lie deep in the endometrium and musculature. In such an event hysterectomy is the only remedy. It must be borne in mind that the gonococci may be disposed of and yet all the macroscopic evidences of the infection may abide and give rise to the usual trend of clinical symptoms. The only positive evidence that the gonococci do exist in the uterus is the seeing of the gonococci. It therefore follows that one must not hastily decide to sacrifice the uterus on clinical evidence.

**FALLOPIAN TUBES.**—During the entire course of acute salpingitis it is imperative to enjoin absolute rest. The patient should be confined to her bed as long as the fever and acute pain continue. During this period all unnecessary examinations and manipulations of all sorts are prohibited for fear of stripping the pus contents of the tubes into the pelvic cavity. In addition to rest, all such measures for the relief of pain and the depletion of the congested tissues as hot douches, glycerin tampons, the hot hip pack, and hot fomentations to the lower abdomen are to be employed.

"George T. Harrison is, in my opinion, somewhat contradictory in

his essay. He says that "in infections of the tubes even the slightest operation on the genital organs may prove dangerous;" yet he highly recommends the method of treatment of the late Dr. Pryor, namely, a thorough curetting to cut off the main source of the infection. He then opens the cul-de-sac of Douglas, and with the finger introduced through the opening, frees the tubes and ovaries. The tubes are then brought out of the opening. Passing a probe through the fimbriated extremity, he inserts a strip of iodoform gauze which is removed when he is through with the rest of the manipulation in the pelvis. Next he packs the uterus and the whole cul-de-sac with iodoform gauze. The uterus is restored to its normal position, and finally the vagina is also packed with iodoform gauze.

J. B. Killebrun favors curetting as soon as possible in acute gonorrhoeal endometritis. He believes that when the uterus is infected the adnexa are likewise diseased and should be treated. He advocates Pryor's method." (Boldt.)

When the tubal infection continues to cause serious disturbances, and at intervals of weeks and months is awakened to acute exacerbations, operative measures should be resorted to. But when the diseased tubes exist with little or no discomfort to the individual there is no occasion for operative interference. Here the removal of the tubes alone seldom results in complete relief. Nothing short of the complete extirpation of the uterus and its appendages will promise an ultimate cure. When possible, the ovaries or a portion of them should be saved. The choice between a vaginal and abdominal operation will largely depend upon the extent of the adhesions, with preference for the vaginal route when possible.

**OVARIES.**—In the management of chronic gonorrhoeal ovaritis the utmost conservatism should be exercised.

When the ovaries are infected sterility is all but inevitable, not alone because the integrity of the ovaries is lost, but the morbid conditions resident in the tubes and uterus contribute to a large degree to the sterility. The fact that a woman is rendered sterile by the infection is no justification for the removal of the ovaries, for while they may be diseased they may still serve a useful purpose in providing an internal secretion that is essential to the well being of the organism.

To this end all the conservative measures are to be persisted in,

that are discussed in the previous pages, before resorting to surgical interference. And when these measures fail to give the desired relief, when the patient persists in her complaints of pain, conservative surgery must be invoked, but not the surgery that calls for the sacrifice of both ovaries.

I seriously question if in a young woman it is necessary in any case to remove all of both ovaries. Even when both ovaries are the seat of abscess formation it is possible to leave a portion of the abscess wall.

**RECTUM.**—In the early stages Small recommends the injection of a ten per cent solution of argyrol combined with deodorized tincture of opium. Not more than one ounce to be injected at one time.

After the acute stage has subsided an astringent injection of zinc sulphate and pulverized alum, 15 grains each, together with 3 drachms of bismuth subcarbonate and 4 ounces of distilled water will be found beneficial. In stubborn cases the speculum should be introduced and all granulated spots swabbed with a 10 to 20 per cent solution of silver nitrate.

**GONOTOXINE.**—This substance is regarded by Maslooski as the product of the gonococcus and is credited with the production of the general symptoms of gonorrhoea.

According to Maslooski this toxic substance exerts both a local and general influence. The local action is inflammatory, both suppurative and non-suppurative; the general action is elevation of temperature and other symptoms common to septicaemia. Injections of gonotoxine do not produce immunity. This is the basic principle of antigenococcic serum—a remedy which is not as yet approved but one which deserves a fair trial.

#### **THE VACCINE TREATMENT OF GONORRHOEAL VULVO-VAGINITIS IN CHILDREN.**

Butler and Long of Chicago (J. A. M. A., March 7, 1908), make the following report on their clinical observations with gonorrhoeal vaccine in the treatment of vulvovaginitis in children:

“Wright’s technic was adhered to in estimating the index. As this latter has been so frequently discussed we feel that we can dispense with describing it.

“It may, however, prove of some interest to those busy with

the gonococcus in this work, to mention some of our experiences with it. Contrary to what we expected, we have not found it a difficult organism to work with. The media employed for its cultivation were blood serum and blood agar. It seems to bear considerable variations in temperature and to remain viable for a number of days. Blood agar has proved especially satisfactory for propagating its growth.

"In regard to the preparation of an emulsion, we have found that if a culture of gonococci of from six to eight hours old is used there is no trouble with clumping. It is our custom, therefore, to make a culture from six to eight hours before we wish to use it. Cultures twenty-four hours old give rise to so much clumping that we cannot well understand how accurate results can be obtained when they are used. We think that the use of young cultures is one of the important points in minimizing the difficulties of opsonic work in general.

We employ an emulsion that will average from four to eight gonococci to a cell, believing that less inaccuracy will result than when an emulsion averages one or two to a cell.

"What holds good in the preparation of the emulsion for the testing of the blood also holds good in the vaccine emulsion.

"If in this instance young cultures are used, standardizing of the vaccine is possible and practical, in contrast to the impracticability of breaking up the clumps found in emulsions prepared from older cultures.

"The time for incubating in the technic for obtaining the index with the gonococcus depends on the thickness of the emulsion. Our usual time is fifteen minutes.

"The vaccinations were interspaced according to the index, making an effort, so far as possible, to give the patient the injection before an index declined below normal. We do not feel justified in generalizing as to dosage of vaccine, nor in making any statements as to the time the index will remain above normal after vaccination. We have found that the dosage varies in different cases, and can be determined only by investigating for each individual case the immunizing response to a given dose as indicated by the index. This may be observed on inspection of some of the charts in which can be seen that while little or no response may follow a small

dose, and likewise a large dose, apparently, for the individual, a marked rise in the index will be found following a dose between the two extremes. The minimum dose used was one million and the maximum fully fifty millions.

"We used two vaccines, which are designated vaccine *a* and vaccine *b*.

"Vaccine *a* was prepared from a culture taken from one case of gonorrhoea. Vaccine *b* was prepared from cultures made from four cases of gonorrhoea. They were both standardized to 20,000,000 per cubic centimeter.

"No effort was made to isolate the gonococcus in each individual case. The children treated ranged in ages from one and one-half to twelve years. Ten of the cases were the result of a ward epidemic. The other two patients entered the hospital with gonorrhoea. No unusual complications referable to gonorrhoea developed in any of the children.

"It will be observed that in four of our cases treated with vaccine the clinical evidences of gonorrhoea disappeared in from ten days to three weeks, and that the gonococcus was not to be found in smears made from wipings from the vaginal mucosa, taken at intervals of several days. Of the remaining eight cases in all but three a cessation of discharge and disappearance of gonococci from smears was attained after several weeks of treatment.

"In three of our cases the sequences of treatment have been not a little handicapped by inability to control the disposition of them. When a child under treatment shows subsidence of clinical symptoms, and a disappearance of discharge, and even has only one negative smear, she should be removed at once from a general venereal ward; in other words, she should be isolated, to protect her at least from reinfections.

"Four of the second twelve cases were under treatment respectively 41, 48, 64, 96 and 176 days, the latter being the only one of the four patients in whom the discharge stopped. The remaining patients were under treatment from 24 to 31 days.

"As previously stated, we believe that comparisons as to the respective merits of different methods of treatment are ordinarily unsatisfactory unless they involve a large mass of material, still we

believe that the above results are not without value in establishing the efficacy of vaccine therapy in gonorrhoea in the female.

“The contention might be raised that gonorrhoea is aggravated in female children by local treatment and that the discontinuance of such treatment might be expected to be followed by betterment. The possibility of this should be conceded, but when we are able to trace daily variation in the clinical manifestations with the ebb and flow of the wave of immunity, when we see within twenty-four hours a profuse discharge cease and find negative smears coincident with a marked rise in the opsonic index, the above contention loses much of its weight, and in the cases treated must be excluded from consideration in calculating results.

“If from our work any conclusions are permissible, we believe it no exaggeration to state that vaccine therapy has a place in the treatment of gonorrhoea in the female, that it appears to be far more efficient and at the same time scientifically more tenable than local antiseptic treatment.”

## SYSTEMIC GONORRHOEAL INFECTIONS.

The presence of the gonococcus and its toxines in the blood gives rise to certain well defined systematic disorders as well as local lesions remote from the site of the original infection.

**GONORRHOEAL SEPTICAEMIA AND PYAEMIA.**—In a large number of cases of primary gonorrhoeal infection of the urogenital tract of women there has developed a progressive septicaemia or pyaemia in which the gonococcus has been found in the blood in pure culture and in large numbers.

The fever which accompanies these cases is not necessarily an indication of general infection; in fact it is probable that in the majority of cases it is due to the absorption of toxines into the blood rather than of gonococci.

The symptoms may arise within the first week of the primary local lesion and may follow gonorrhoeal infection of the urethra, vulva, vagina, uterus, tubes, peritoneum, conjunctiva and endocardium.

**GONORRHOEAL ENDOCARDITIS.**—There may develop no other lesion than endocarditis subsequent to the primary lesion, but more often the involvement of the endocardium accompanies that of the joints.

The lesion is not infrequent and renders the prognosis very grave and uncertain.

Thayer analyzed 11 cases in the service of Osler in Johns Hopkins Hospital; in 6 of these cases gonococci were found in blood cultures and in 2 the gonococci were recognized in cover slip preparations. Two of the cases were mixed infections.

Councilman observed a case of gonorrhoeal myocarditis. Hering also reported a case of gonorrhoeal myocarditis. Rarely the ulcerative type of gonorrhoeal endocarditis has been observed. Embolic, septic pneumonia and iritis are occasional sequellae.

**GONORRHOEAL ARTHRITIS.**—Osler writes: "In many re-

spects this is the most damaging, disabling, and serious of all the complications of gonorrhoea."

It occurs more frequently in males than in females, and is relatively common to children who have suffered infection of the conjunctiva, vulva and vagina.

In the majority of cases the joints are affected while the initial lesion is yet in the acute and sub-acute stage, though instances are not rare where the joints become involved in the chronic stage of the initial infection.

One or more joints may be involved. In about one-third of the cases a single joint is involved. The joints most liable to infection are the intervertebral, sacro-iliac, temporo-maxillary, and sternoclavicular. In the involved joints pure cultures of the gonococcus may be found or there may be a mixed infection. In the former the inflammatory reaction is usually non-suppurative, in the latter it is often suppurative. This is also true of the periarticular tissues and tendon sheaths to which the infection may extend.

The following clinical varieties are recognized by Osler:

- (a) Arthralgic, where there is no redness or swelling, but the patient complains of inconstant pains about the joints.
- (b) Polyarthritic, where two or more joints are involved, are red and swollen. In the acute stage febrile symptoms are present.
- (c) Acute Gonorrhoeal Arthritis, where but one joint becomes the seat of an acute inflammation, which is marked by much swelling, redness and pain, together with a low grade of fever.
- (d) Chronic Hydrarthrosis.—One joint is usually involved. The knee is the joint of predilection. There may be no pain, redness or swelling.
- (e) Bursal and Synovial Form.—The articulations may not be involved, only the bursae, tendon sheaths and periosteum. The sites of predilection are the patella, tendo-Achillis and olecranon.
- (f) Septicaemic.—This form of arthritis is associated with septico-pyaemic symptoms and often with acute endocarditis.
- (g) The Painful Heel of Gonorrhoea.—This is due to a perostitis and exostosis of the os calcis.

The prognosis is uncertain as to time of cure but ultimate recovery is the rule, though it may take years. The septicaemic forms and particularly those associated with an involvement of the heart

present a very unfavorable prognosis and are often fatal. The presence of a mixed infection adds to the gravity of the prognosis.

The treatment is in a general way that of articular rheumatism. The primary lesion demands attention along with all complicating lesions.

The salicylates and alkalis are of little or no value. Potassium iodide is also of no value. French finds the administration of tonics of iron and arsenic the most valuable. He also recommends good food, fresh air and the local application of hot air to the joints. Cauterization and blisters may be of value. Surgery must be invoked in asperating fluid from the joints and in establishing drainage of pus.

E. E. Irons (*J. of Infectuous Diseases*, Vol. 5, No. 3), has published the results of his observations on the Treatment of Gonococcus Arthritis by Injections of Dead Gonococci. In his report he writes:

"Clinically in a number of cases the injections of dead gonococci have seemed to be of distinct value. Many more series of cases must be studied before a definite opinion can be expressed, but the results obtained thus far seem to indicate that in certain cases at least of gonococcus arthritis recovery can be hastened by the injection of dead gonococci. No harm has appeared to follow the injections, and it is possible that the use of larger doses will be found desirable in some cases. With further work the limitations as well as the advantages of the method will appear, and it should be recognized that while it is attractive theoretically as a specific therapeutic measure, too much must not be expected of it in the way of marvelous cures. It should be used rather in conjunction with other general measures such as rest, aspiration of joints distended with fluid, massage of the prostate, and other surgical and general hygienic treatment. The reliability of the clinical gonococcus reaction as a diagnostic procedure will also be determined only after many tests. It has many points in common with the tuberculin reaction, and similarly, too, there may well be cases of gonococcus infection found which do not respond. It appears, however, to be well worth a trial. Should the reaction prove to be reliable, a valuable and much-needed aid will be at hand for the diagnosis of obscure joint, synovial and periosteal diseases."

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